FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list :—

1927

Dec. 31 .... **Entries Close for R. 38 Memorial Prize (R.Ae.S.).**

1928

Jan. 6 .... **Federation Aeronautique Internationale Conference, Paris.**

Feb. 1 .... **"Aircraft in Small Wars." Wing-Comdr. R. H. Peck, before Royal United Services Inst.**

Aug. 6 .... **Air League Challenge Cup**

Sept. — .... **Schneider Trophy Race.**

Oct. 7-28 .... **International Aircraft Exhibition, Berlin.**

1929

Oct. 31 .... **Guggenheim Safe-Aircraft Competition Closes.**

EDITORIAL COMMENT

THIS being the last issue of FLIGHT in 1927, and nothing outstanding having occurred recently to call for any special comment with the exception of the disappearance of yet another transatlantic aspirant, there is an opportunity for "taking stock" of the aviation situation, for looking back on the year that is just drawing to a close, and for attempting to evaluate the progress which 1927 has given us. In doing so, it is necessary to pay due regard to what has been accomplished abroad during the period under review in order to retain a true perspective when viewing matters at home.

1927

There is little doubt that 1927 can be written down as the year of the great flights. Never before in the history of flying, not even in the famous year of 1919, has there been such a number of long-distance flights, each beating the preceding one by a very considerable distance. There has, however, been this difference: that, whereas in 1919 almost all the great flights could be claimed by Great Britain (the transatlantic, the England–Australia and England–South Africa, etc.), a large percentage of the great air journeys of 1927 were made by machines and pilots of nationalities other than British Lest it should be thought that this fact might give cause for uneasiness, it might be well to state emphatically that this is not the case. Other nations have carried out flights that will live for ever in the history of aviation, such as the American transatlantic flights by Lindbergh, Chamberlin, Byrd, Brock, etc., and the Pacific flights by pilots of the same nationality. We have no desire to belittle in the least degree the achievements of these gallant aviators. Far from it. They took their lives in their hands and faced tremendous risks. All honour to them. But for each successful attempt there were two or three unsuccessful, and it is no good closing our eyes to the fact that the victories over time and distance were dearly bought. The attitude of FLIGHT towards such undertakings is already well known, and it will suffice if we state once more as our firm conviction that unless and until long-distance flights over the open sea can be made on marine aircraft possessing

a reasonable degree of seaworthiness in case of a forced descent, they were better left alone. In the aggregate they do more harm than good to the cause of aviation. Unfortunately, a few British adventurous spirits were misguided enough to make the attempt, and thus we, like so many others, are left to mourn a number of splendid fellows who could ill be spared.

In another direction the year does have some very magnificent results to show, and it is at least debatable whether, from a purely practical point of view, the flight from Amsterdam to Batavia and back by a Dutch pilot on a Dutch machine fitted with British engines is not the most meritorious performance of the year. Where the other great flights merely showed that, providing the engines hold out, the Atlantic can be traversed, the Dutch flight to the East Indies and back was of real practical service, in that it demonstrated that one may hope for the time, not very far distant, when mails can and will be transported over very great distances at a very high average speed.

Of British long-distance attempts, none succeeded in establishing a record, or at least in holding it for any length of time. Carr and Gillman, by their flight to the Persian Gulf, did set up a record, but only for a few hours, when it was beaten for distance by a transatlantic flight. In the light 'plane class, we have done better than any other nation by such long-distance flights as Berk Hinkler's from London to Riga non-stop, and Lieut. Bentley's flight from London to Cape Town by stages.

For Great Britain 1927 has been remarkable as a "seaplane year," and, although not in the nature of nor intended as, record attempts, such events as the Baltic cruise, and the Far East cruise now in progress, have demonstrated the enormous progress which Great Britain has made with the production and operation of marine aircraft. Also in the seaplane class was the magnificent Schneider Trophy victory of Lieut. Webster, who by the speeds maintained in the race established several world's records, only to be beaten two months later by one of the Italian pilots on an Italian Schneider machine. Maj. de Bernardi now holds the world's speed record, not only for seaplanes but for machines of any type, with a speed of 296·82 m.p.h. Another outstanding Italian seaplane performance was that of the Marquis de Pinedo, who crossed the South Atlantic by flying-boat, and then crossed South America, reaching the United States, where his machine was destroyed by fire. He returned across the North Atlantic in another machine.

Turning from the subject of long-distance flights to one of a much less spectacular but no less useful nature, as far as the British Empire is concerned, 1927 has shown an almost phenomenal growth in private flying. From a very modest beginning, the Light Aeroplane Club movement and private flying in general have increased by leaps and bounds, and there cannot be the slightest doubt that, although at the moment rather artificially sustained, this movement has come to stay and has proved itself of very great assistance in producing what Sir Samuel Hoare has termed "air-mindedness."

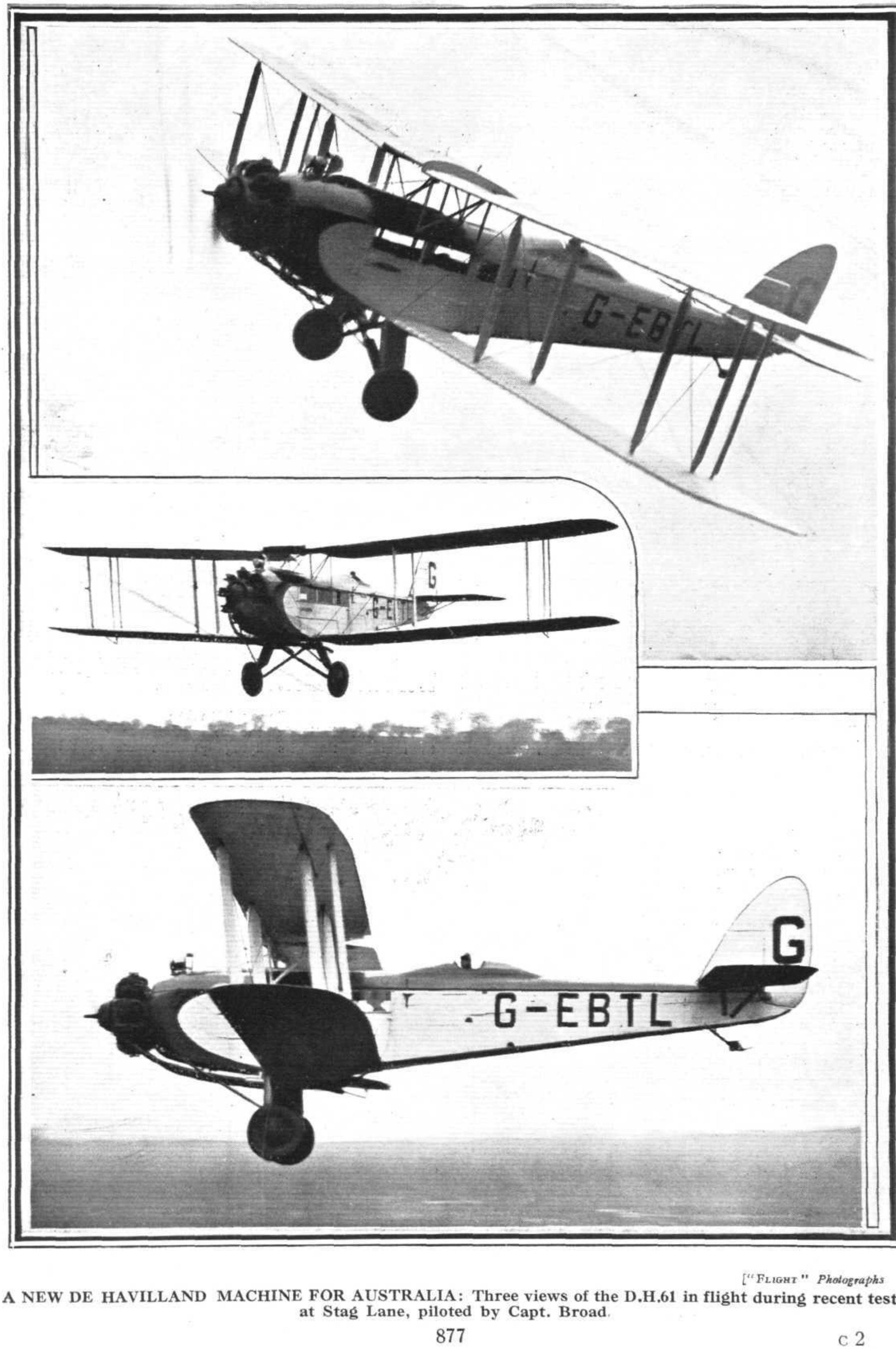
Civil aviation, in the sense of "commercial" aviation, has progressed steadily all the world over, but as regards the British Empire it is to be feared that we are very much where we were last year. It is true that we have opened up as a civilian undertaking the desert route from Cairo to Baghdad, and that the machines and engines used have proved themselves very reliable. But owing to the attitude of the Persian government the hoped-for extension to Karachi has not been realised, and so the "link" in the Imperial air route chain has not attained the importance which it should have done.

On the subject of Empire air defence, the year has not been without its achievements, although the "deceleration" in the programme has naturally resulted in a smaller expansion than was at one time contemplated. The manœuvres this year rather gave one furiously to think, and although some of the bombing machines that took part in the "raids" on London were successful, it would seem, at any rate to the ordinary civilian mind, that there is little to be hoped for from the point of view of defeating a really determined enemy. That means only one thing, *i.e.*, the truth of the old saying, only in an even more pertinent form, that "attack is the best defence." If there is no satisfactory way of defending ourselves against air attack, the only remedy is a striking force so strong and so well organised that any potential enemy would hesitate to invite reprisals. Unless and until universal disarmament becomes a practical possibility, we fail to see that any other course is open. That this inevitably points towards an air armament race is to be regretted, but we have not yet heard of any other practical way out of the difficulty. And Great Britain, by "decelerating" her air programme, has set an example which, more is the pity, has not been followed by other nations. It is not to be expected that we can go on indefinitely with an Air Force which in size is totally inadequate to our needs, and the urgent problems of the coming year will be, failing other countries following the lead given by Great Britain, to proceed at a more rapid rate with our expansion programme.

Technically, 1927 has seen steady progress all round, with perhaps the greatest step forward marked by the production of all-metal or at least metal-hull flying-boats of such size as to be quite reasonably seaworthy. Not that metal construction has been by any means confined to marine aircraft. On the contrary, there has been a general tendency towards all-metal construction of aircraft of all types, and there is now scarcely a firm which does not produce metal machines. In very many cases such firms have evolved their own forms of construction, and a number of excellent types have been developed. A few other firms rely on obtaining some of the more difficult parts from firms with special experience ; nor is there any particular objection to this, since in case of war, the contingency at which in particular metal construction is aimed, the originators would form a very small percentage of the firms producing the particular type of part.

Aero engines have progressed along well defined lines, as was to be expected from the fact that the production of a new engine is a much more laborious process than the production of a new type of aircraft. In this country at any rate, the year has been marked by a decided tendency towards a much wider employment of the air-cooled engine, although it cannot yet be said that this has superseded, or is likely to supplant in the near future, the older water-cooled type.

Taking it all in all, if 1927 has not been a year of great prosperity for the aircraft industry, it might easily have been worse. With that reflection we will wish all our readers a Happy and Prosperous New Year!



["FLIGHT" *Photographs*

A NEW DE HAVILLAND MACHINE FOR AUSTRALIA: Three views of the D.H.61 in flight during recent tests at Stag Lane, piloted by Capt. Broad.

THE DE HAVILLAND 61

A 6-8 Passenger Machine for Australia

IN our issue of November 7, 1927, we published a brief description and a side elevation of a new commercial aeroplane designed and constructed by the de Havilland Aircraft Company for an Australian firm. The machine has now been completed, and has passed most of its flying tests so that a more detailed description of it has become possible. A few more tests still remain to be carried out, but already it has been definitely established that the D.H.61 has a quite remarkable performance for the paying load it carries. For instance, the paying load is no less than 1,900 lbs. (with a Bristol "Jupiter VI" engine), and with this the machine has a top speed of 126 m.p.h., and will cruise well throttled at 105-110 m.p.h., at which speed it has a still-air range of about 475 miles.

In designing the D.H.61, Colonial requirements were kept in mind, and although the machine has been produced specially to the order of MacRobertson & Co., Ltd., of Adelaide, the great Australian fruit preserving company, the 61 should, by very minor alterations, be a suitable type for quite a number of regular air lines where as yet the traffic is not large enough to justify the purchase of a more powerful three-engined type. Its load-carrying capacity is such as to make it an economical machine to operate, especially bearing in mind the high performance. For instance, with fuel for nearly 500 miles at a cruising speed of well over 100 m.p.h., the paying load is $4\frac{1}{4}$ lb./h.p. For shorter ranges this load is, of course, correspondingly greater, and *vice versa*. As the Bristol "Jupiter" has a reputation for low cost of upkeep, the 61 should be a machine with many applications. The fitting of floats would probably be a comparatively simple matter, so that in districts where the seaplane type is to be preferred the 61 again would seem to meet the case. As a seaplane the paying load might be slightly smaller, although the difference would probably not be sufficiently great to be really serious.

["FLIGHT" *Photograph*

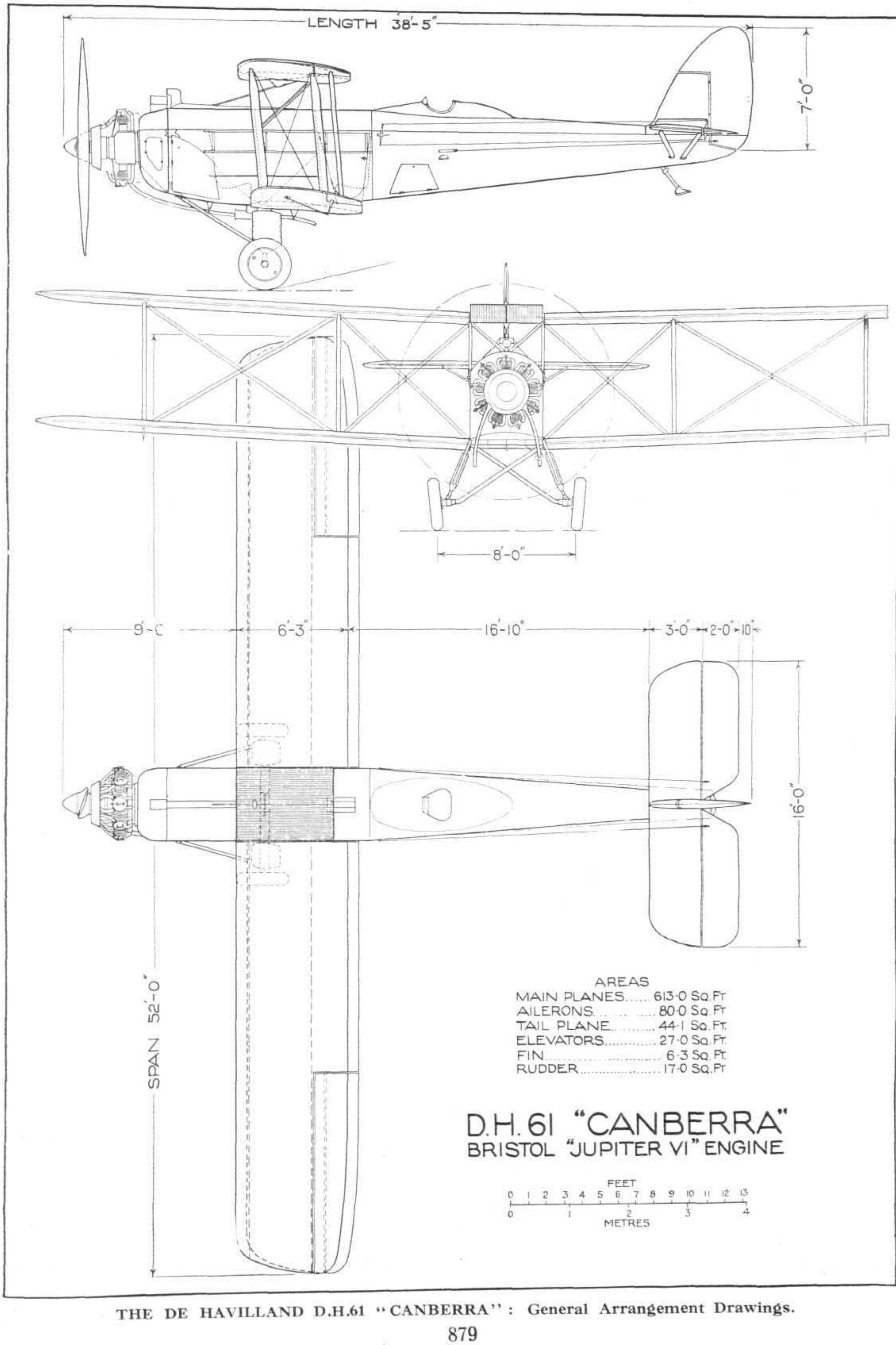
THE DE HAVILLAND D.H.61: Front view. The Bristol "Jupiter" engine looks quite small on the large fuselage. Note wide wheel track.

The De Havilland D.H.61: Three-quarter front view of the machine with wings folded. The top centre-section (the petrol tank) is on a higher level than the wings, so that the corners of the top plane can pass under it when folded.

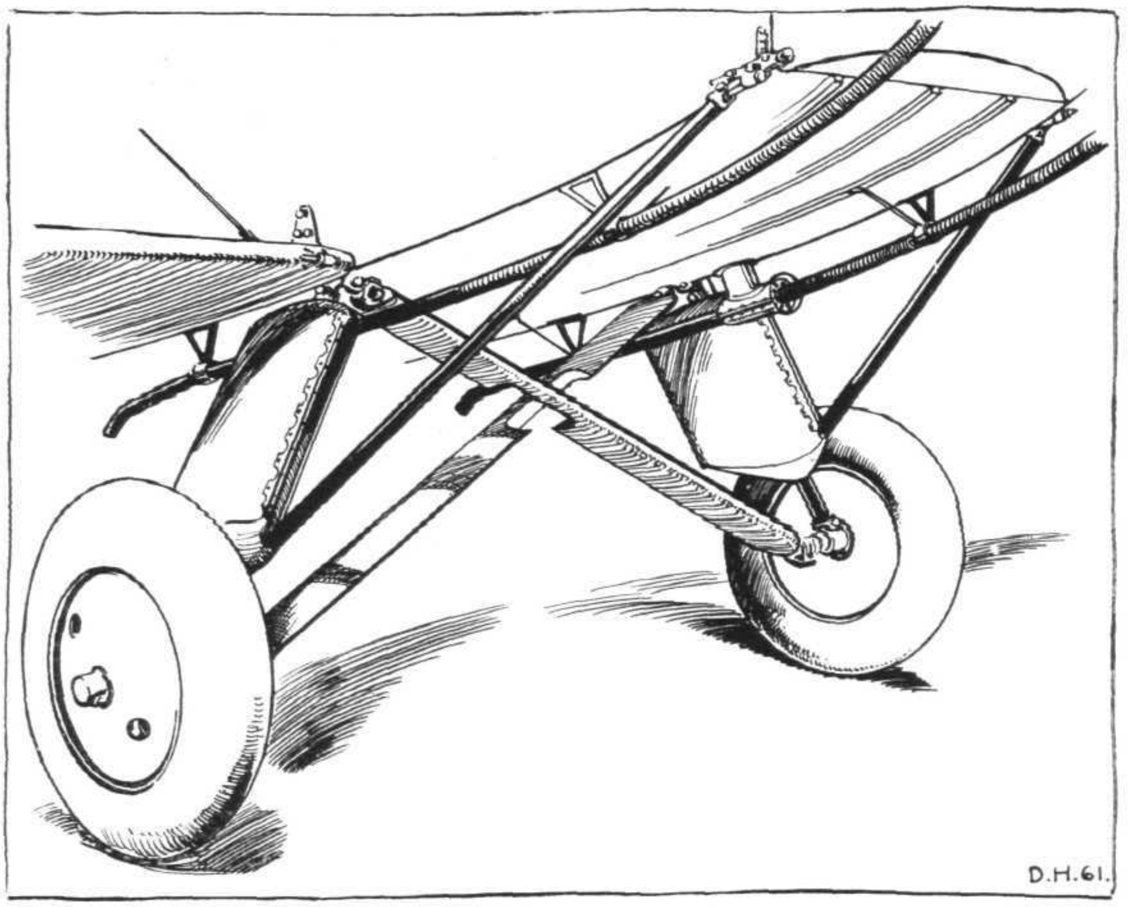
["FLIGHT" *Photograph*

General Design

There is little in the general design of the D.H.61 to indicate that its flying qualities are at all out of the ordinary. The machine is just a straightforward tractor biplane of typical de Havilland lines, and in a crowd of machines it might easily pass more or less unnoticed. In fact, those who have been beguiled by the success of a number of monoplanes during the past year might be forgiven for thinking that the 61 was merely a result of the designers having got into a rut from which they either could not, or did not bother to, escape. The monoplane looks an



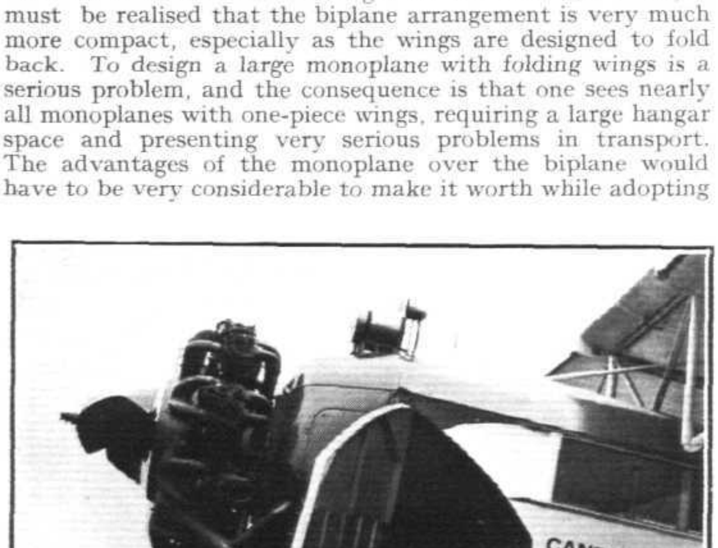
THE DE HAVILLAND D.H.61 "CANBERRA": General Arrangement Drawings.



An unorthodox undercarriage: On the D.H.61 there is no wheel axle across from side to side, the two halves of the chassis being quite independent of each other. The wheel track is very wide, and a large travel of the wheels is obtained.

[" FLIGHT " *Sketch*

attractive proposition. It has an appearance of " cleanness " which is rather tempting at first. But this appearance is largely deceptive. When one goes into the subject, it is found that, aerodynamically, there is so little to choose between the biplane and the monoplane that the preference for one type or the other is more often than not due to reasons other than aerodynamic. That being so, and bearing in mind that the " Canberra," as this first " 61 " has been christened, is a machine of a total loaded weight of well over 6,000 lbs., it must be realised that the biplane arrangement is very much more compact, especially as the wings are designed to fold back. To design a large monoplane with folding wings is a serious problem, and the consequence is that one sees nearly all monoplanes with one-piece wings, requiring a large hangar space and presenting very serious problems in transport. The advantages of the monoplane over the biplane would have to be very considerable to make it worth while adopting the type, and as they are by no means so, it is not a difficult matter to make out a very good case for the biplane. One may be quite certain that the de Havilland Aircraft Company is fully alive to this fact, and that the biplane arrangement was not chosen merely because most of the firm's machines have been of that type.



[" FLIGHT " *Photograph*

A NEAT INSTALLATION : The Bristol " Jupiter VI " in the D.H.61. Large exhaust pipes taken under the fuselage reduce the engine noise to comfortable proportions. The hot air muff for heating the air in the cabin can be seen on the pipe on the port side. Note also the large front luggage compartment, which will take a cabin trunk or two.

As to the features of the design which have resulted in such a good performance for the load carried, it is not very easy to point to any one thing and say that that is the main reason. The fuselage is of the type which has come to be somewhat derisively known as " slab-sided," and it is of relatively large cross-sectional area. Thus, superficially, there seems to be little reason to expect a very low body drag. On the other hand, the nose of the fuselage has been very carefully designed, and as the pilot's cockpit is well aft of the wings, the whole front portion of the fuselage is entirely free from excrescences (with the exception of an oil cooler and an air intake for the ventilation of the cabin). The " Jupiter " engine, in spite of a not inconsiderable diameter, looks quite small on this fuselage, and in spite of the relative absence of cowling, it seems likely that the air flow over this region is fairly free.

The biplane wing arrangement has also been designed with a view to good aerodynamic efficiency. The wing span is 52 ft., the wing chord 6 ft. 3 in., and the gap 7 ft. The gap/span ratio is thus $7 : 52 = 0.135$. The " Span loading " (*i.e.*, Span^2/W) is $2.704/6.200 = 0{\cdot}436$. At the cruising speed of 110 m.p.h., L/D_i (ratio of Lift over induced Drag) is 54. This is the monoplane value, and with the biplane arrangement used, *i.e.*, a Gap/Span of 0·135, this value is increased to 68·8, so that the induced drag at the cruising speed is only 90 lbs., corresponding to a horse-power of 26·4 only. Even allowing for propeller inefficiency, the power required to overcome induced drag at cruising speed is under 40 h.p. A monoplane, to give the same value of induced drag at the same speed, would have to have a wing span of about 66 ft., and as it would probably not be fitted with folding wings, would be rather a cumbersome affair for its weight. The thin wing section of the 61, *plus* its bracing wires and struts, probably has no greater profile drag than that of a thick section such as would be used in a monoplane wing.

Structural Design

Intended for use in Australia, the D.H. 61 has been designed as a very simple and robust machine, mainly of wood construction, and such few metal fittings as are unavoidable have been kept as plain and straightforward as possible. The fuselage is of the normal De Havilland type, with four longerons and a skin or planking of plywood. This again, is covered with fabric, and all joints and edges in the plywood

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

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EDITORIAL VIEWS

This is the 24th issue of THE AIRCRAFT ENGINEER, the first number of which appeared with the issue of FLIGHT, dated January 28, 1926, and has thus been in existence for two years. During that period our technical section of FLIGHT has, we are very glad to say, met with a general and widespread approval, and we shall not be accused of boasting if we claim that THE AIRCRAFT ENGINEER has now come to be looked upon as something out of the ordinary, something which has no exact parallel in other countries.

During the past year we have had contributions from a number of specialists; mostly British, but also a few distinguished writers and engineers of other nationalities. It is our hope that in the coming year we may be able to extend our scope and widen the circle of our contributors. But that largely rests with members of the British Aircraft Industry. THE AIRCRAFT ENGINEER is intended not only as a medium for designers to express their views, but for educating junior members of our designing staffs who will, one day, hold leading positions in the industry. Consequently, we have not confined our articles to material of so complex a nature that only the very experienced and advanced can follow the arguments. There are innumerable subjects upon which there is plenty of room for argument, where opposing views can be equally well upheld and substantiated, and we had hoped that more would have taken advantage of the opportunity which THE AIRCRAFT ENGINEER affords for discussion. Several articles published have been of a controversial nature, and we can only assume that the relative absence of opposing views has been due to modesty on the part of many who are qualified to judge. Let us hope that in 1928 such will overcome their shyness and will come forward with their opinions and ideas.

Already we have several very interesting articles promised us, and some of the general subjects dealt with by Mr. J. D. North will be elaborated by another writer whose name has not hitherto appeared in our pages. But we are still a very long way from being satisfied, and would ask technical people in the industry to do their share towards making THE AIRCRAFT ENGINEER fulfil in full measure the purpose for which it was established.

WHEEL BRAKES AND THEIR APPLICATION TO AIRCRAFT.

Effect of Braking.

By G. H. DOWTY, A.F.R.Ae.S., M.I.Ae.E.

(*Continued from p. 74.*)

In the last issue of AIRCRAFT ENGINEER the writer set forward the case for wheel brakes and indicated suitable types of undercarriage structures for withstanding the torque loads. The present article will deal with the effect of braking, and show to what limits it can be taken with safety.

There is possibly no other vehicle where the effect of braking calls for a more careful study. The possibility of a machine nosing over is a primary consideration in the effect of braking, but it will be shown that if care is taken in positioning the wheels, then the possibility of nosing over can be practically eliminated.

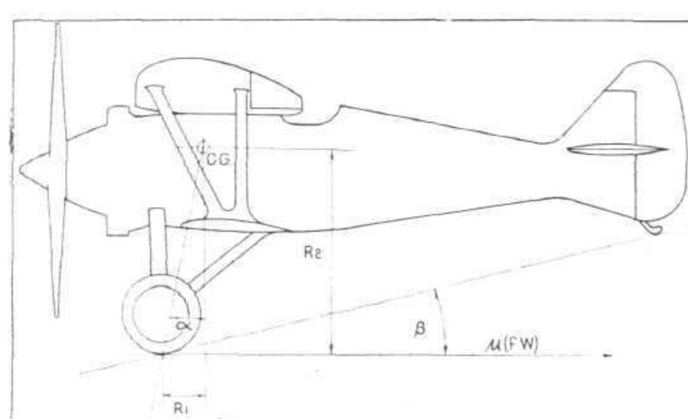


Fig. 5.

The worst case will occur in a tail-up landing, although it is not suggested that the brakes will be normally applied when a machine is in this position. Yet, in order that every contingency may be covered, the tail-up case must be taken, and will provide the conditions governing maximum permissible braking. This statement may be criticised in view of various systems for brake operation from the tail skid, but when control systems are discussed at a later stage more detailed reference will be made to this method of operation.

Fig. 5 shows a side elevation of a machine.

Let fW = Load borne by wheels.
R_1 = Distance of wheel ahead of C.G.
R_2 = Distance of C.G. above ground.
μ = Coefficient friction between tyre and ground.

The maximum brake load is given by $\mu f W$, and consequently, upon application of the brake load, there is a pitching couple of value $\mu f W R_2$, and a counteracting couple of $f W R_1$. In order that the aeroplane may not nose over

$$f W R_1 > \mu f W R_2.$$

The limiting value of μ is therefore :—

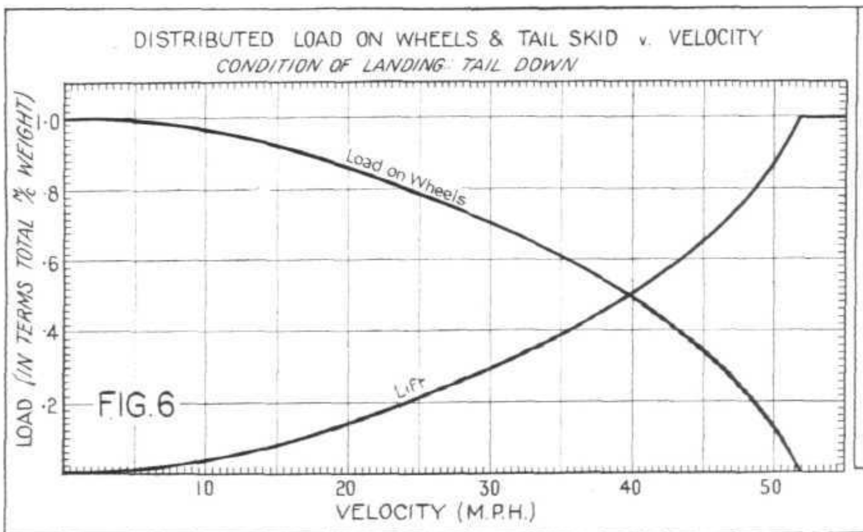
$$\mu = \tan \alpha.$$

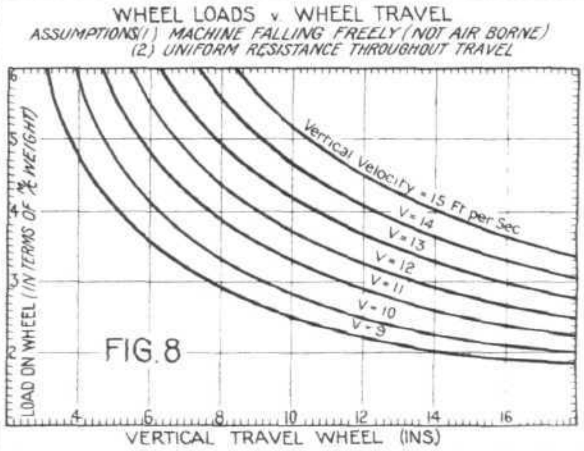
This angle is usually between 12° and 13°, on normal undercarriages, but where wheel brakes are fitted American practice is to increase this angle to 17°.

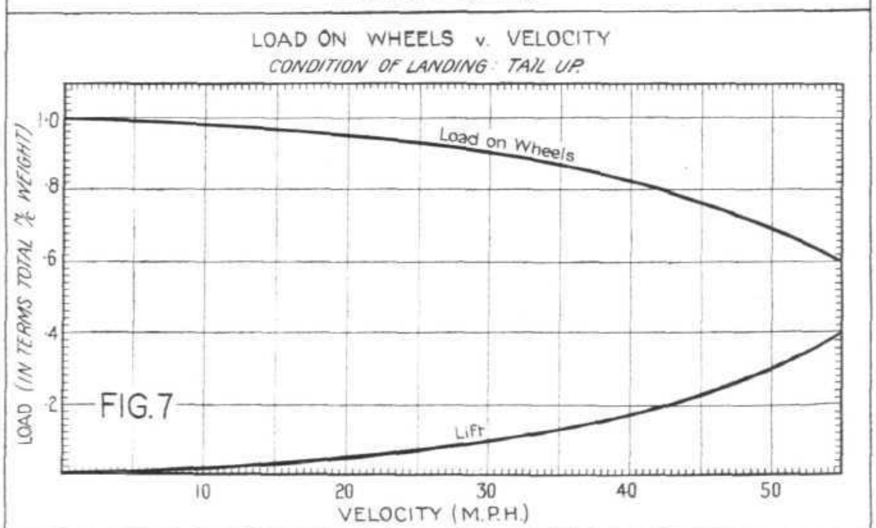
These statements are borne out by actual tests,* which have shown that, with a well-proportioned undercarriage, the wheels may be locked and the machine landed without difficulty.

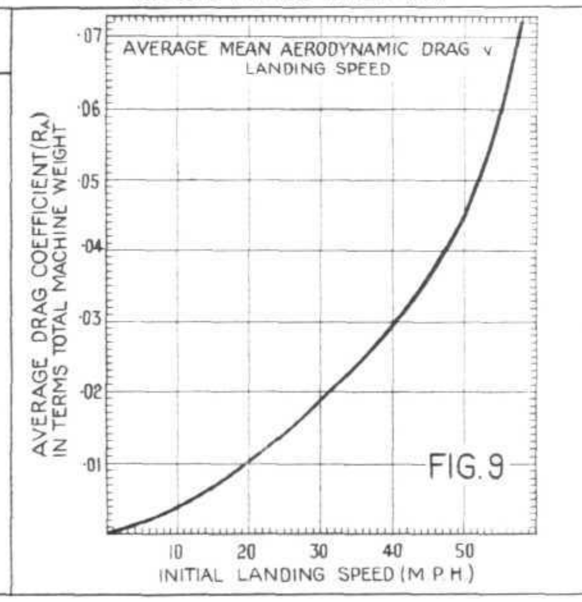
Coefficient of Friction.

In the whole question of brake design there is, perhaps, no more arbitrary point than the coefficient of friction between tyre and ground. This is unfortunate because it is the datum line from which brake design starts. The coefficient varies between wide limits depending upon the nature and conditions of the surface, inflation pressure of the tyres and type of tread. If the tyres are very soft and the surface uneven, then it has been found that coefficients of friction in excess of unity can be obtained, due to interlocking of the tyre with the interstices of the ground. For any given tyre, increase of inflation pressure produces a slight improvement on the braking effect, since the area of contact is reduced and the pressure per unit area increased.









In order that the value of braking may be appreciated, the tangents of angles 12° to 17° are given below.

α	12°	13°	14°	15°	16°	17°
tan α	0·212	0·230	0·249	0·267	0·286	0·305

A disadvantage may be found in placing the wheel forward, in view of increased tail loads, but 17° has been found to be a sound compromise, permitting of excellent braking.

In a tail-down landing angle α will be increased by angle β. Angle β is usually about 12°, and the braking can be considerably increased.

$\alpha + \beta$	24°	25°	26°	27°	28°	29°	30°
tan $(\alpha + \beta)$	0·445	0·466	0·487	0·509	0·532	0·554	0·577

In the case of a machine with wheels disposed such that angle α is 17°, then the wheels may be locked and a safe tail-up landing made, providing the coefficient of friction between tyre and ground does not exceed 0·3. If the more usual three-point landing is made then, under similar conditions, the coefficient can reach 0·5 with safety.

In a paper dealing with four-wheel brakes and read before the Inst. Auto. Eng., Mr. F. A. Stepney Acres has shown that over a series of tests on road surfaces, the coefficient varies between 0·46 and 1·3, with an average value of 0·7.

Enquiries from the Dunlop Rubber Co. produced the following information :—

Coefficient Friction between Tyres and Various Surfaces.

Surface	Condition	μ	Authority
Granite setts	... Greasy	0·2	Dunlop Rubber Co.
Macadam ...	... Dry	0·7	Do.
Steel (smooth)	... Wet	0·1	Do.
Steel (smooth)	... Dry	0·6	Do.

It will be noticed that the coefficient of friction between a rubber tread and ordinary types of road surface may vary

* "Airplane Brakes," by Weaver. "Slipstream," Nov., 1927.

from less than 0·02 to 0·7. In view of landings on steel decks, the coefficients of friction between rubber and steel surfaces are of interest. Upon a wetted steel surface the coefficient is very low, and of the order of 0·1, but the deck of an aircraft carrier is not perfectly smooth, and is slightly roughened by the application of a cement coating. There are no actual figures available for the coefficient of friction on such a surface, but they will be appreciably higher and approximately of the order of 0·7.

Unfortunately there is, to the writer's knowledge, no reliable data concerning the coefficient of friction between aero tyres and landing fields, but from values deduced from actual landing tests, the coefficient appears to be quite small, particularly so on wet surfaces.

The only information obtainable refers to tests on automobile tyres and we can assume that, for aero tyres with smooth treads, these values will be reduced. From comparison of tyres with smooth and patterned treads, it appears that the coefficient of the former is about 0·8 of the patterned (non-skid) type. The maximum coefficient for aircraft tyres probably lies in the neighbourhood of 0·5 with a mean value under normal conditions of 0·25.

From previous considerations of the maximum braking permissible, it will be seen that even in the unlikely event of the wheels becoming locked, a tail-down landing can be made with absolute safety under the worst conditions and a tail-up landing under normal conditions. It has been definitely proved, by actual tests, that wheel brakes are perfectly safe in operation.

Throughout the whole of the preceding work, no reference has been made to aerodynamic resistance. This drag will have the effect of permitting an increase in the brake load, with a consequent reduction in length of run. At speeds below 40 m.p.h. the drag falls off very rapidly and its effect is small compared with the braking produced by the wheels. It has been thought desirable to ignore this drag in view of the additional complications that would be involved by its inclusion.

The magnitude of the braking load is only of interest in so far as the actual brake design and length of run is concerned. The maximum brake load obtainable is equal to the weight borne by the wheels and multiplied by the coefficient of friction between the wheels and landing ground. The weight borne by the wheels has to be determined by subtracting from the total machine weight, that part carried by the air at any instant plus that part carried by the tail skid.

The actual process for determining the weight borne by the air, is quite simple, but the lift experienced will be subject to large variations depending on the attitude of the machine during landing. The extreme cases will be represented in a tail-up and a tail-down landing. Typical values for the lift, in terms of total machine weight, are given in Figs. 6 and 7. When the machine is in any intermediate position, the lift will range between these two sets of values. The results given in the above figures have been obtained from analysis of a particular machine and will serve to indicate the order of loads that may be expected. The excess of weight over lift represents the wheel load and this has been plotted on Figs. 6 and 7. Tail skid loads, being of a small order, have been ignored in the tail-down case. Wheel loads have been obtained on the assumption that the machine has been rolling over a smooth surface and not subject to inertia loading.

During the initial stages of alighting, wheel loads will be of a higher order, depending essentially on the vertical velocity of the aeroplane and the vertical travel of the wheel.

If we consider the total weight of the aircraft to be air borne, then the wheel load (F/W) can be determined from :

$$\frac{F}{W} = \frac{V^2}{2g.T} = \frac{0{\cdot}0155\,V^2}{T}$$

where T is the vertical wheel travel in feet.
If none of the machine's weight is air borne, then :

$$\frac{F}{W} = 1 + \frac{(\cdot 0155\,V^2)}{T}$$

The values given by the latter equation have been plotted on Fig. 8. The actual wheel loads will vary between the figures given by these two methods, depending on the proportion of the total weight carried by the air.

In the case of shipboard landings where the deck is free from obstructions, the order of wheel loads during run to pull up, should approximate more nearly to those values given on Figs. 6 and 7, while on turf or macadam surfaces, the increase in loads will depend on the roughness of the surface and the forward speed of the machine. Some authorities assert that, on average landing grounds, loads up to three times the static load can be experienced during taxi-ing, but with well-designed shock-absorbing units such as present-day machines are normally equipped, the maximum load should not exceed twice the static load and with an average value of 1·1. These figures are confirmed by N.A.C.A. Report No. 249, which shows that under normal landing conditions the maximum load does not exceed 2G with a mean value, during run to pull up, of 1G. These results have been obtained by use of the N.A.C.A. accelerometer and the graphical record of the load alternations is of considerable interest.

The reduction in length of run obtained by the use of wheel brakes cannot be treated in a simple manner. The actual process of calculating the run to pull up, is one of considerable complexity and with many variables entering into the problem. The experience and judgment of the pilot plays a major part in the length of run taken and since this human factor cannot be calculated, it is proposed to consider the retardation of a machine in as simple a manner as possible. The writer believes that the rather large assumptions made, will possibly provide no greater error than those involved in the more complex investigations.

For general comparative purposes we can take the data given in N.A.C.A. Report No. 249. This gives particulars of length of run and landing speed for nine different types. These figures are given in Table 1. Columns 1, 2, 3 and 4 are self-explanatory and in Column 5 the average overall retarding coefficient has been determined.

Table I.

COL. 1	COL. 2	COL. 3	COL. 4	COL. 5	COL. 6	COL. 7	COL. 8	COL. 9
Machine.	Landing speed (V). M.P.H.	Length of run (T_1) Ft.	V2	$\frac{.0334\ V2}{T_1}$	R_A	$\frac{.0334\ V2}{R_A + \mu}$	T_2	% Reduction in length of run.
S.E.5a	54	450	2900	.215	.055	.355	272	39.6
J.N.6H. Curtiss ...	51	575	2600	.151	.047	.348	250	56.5
Spad VII	58	485	3360	.232	.072	.372	300	38.2
VE.7 Vought ...	51	800	2600	.109	.047	.348	250	69.0
DH. 4b...	56.5	725	3200	.147	.064	.364	294	59.5
Co.4 Fokker	56	950	3140	.11	.062	.362	290	69.5
Sperry Messenger ...	44	400	1940	.162	.035	.335	193	52.0
M.B.3 Thos. Morse...	57	875	3250	.124	.068	.368	295	66.4
M.B.2 Martin Bom.	58	925	3360	.122	.072	.372	302	65.0

From analysis of several types of machines, in tail-down attitude, mean aerodynamic drag coefficients have been calculated for various initial landing speeds. The results are given on Fig. 9.

The average aerodynamic drag coefficients taken from this figure are given in column 6.

In order that we can forecast the diminution in length of run, by the application of wheel brakes, we can assume the nominal value of 0·3 as representing the coefficient of friction between the wheels (with tail skid) and ground. The total overall retardation coefficient is given in column 7 and the new length of run in column 8. The percentage reduction in length of run, due to the fitment of wheel brakes, is estimated, under this method, as 57·3. The benefit to be derived from wheel braking is fully demonstrated and the advantages are sufficiently great for efficient braking to be regarded as one of the essential qualities in aeroplane performance.

Reports of the Boeing Air Mail machines say that action of the wheel brakes is astounding and the steering qualities so remarkable that a pilot is able to negotiate his way between obstructions with the ease of a motor-car. Besides the advantages to be gained from quickness of pull up, many accidents occur through poor controllability on the ground,

which could be obviated by suitable brake equipment. Aeroplane wheel brakes are being developed in several countries at the present time and aero wheels complete with brake drums are already in the course of manufacture in this country.

IN THE DRAWING OFFICE.

SOME NOTES ON THE ASSEMBLY OF WINGS.

By W. S. HOLLYHOCK

In arranging the hinge joints and the fore-and-aft direction of the ribs of the main planes on an aircraft, the importance of the combination of angles due to sweepback, dihedral, aerofoil incidence and spar incidence is not always appreciated. The angles are small, and errors, excepting in sweepback, are usually very small, but if not taken into account may give considerable trouble when it comes to erecting and might, in exceptional cases, cause structural failure, due to straining of fittings.

Also let θ_1, θ_{s1}, γ_1, S_1 and H_1 be the corresponding angles and dimensions when the dihedral is taken off, *i.e.*, when the wing is lying on the building jig with the spars horizontal and the ribs at that angle of incidence which will make the vertical and horizontal centre lines of the spar sections truly vertical and horizontal.

Then it will be seen from the accompanying diagrams that the dimensions and formulæ are as follows :—

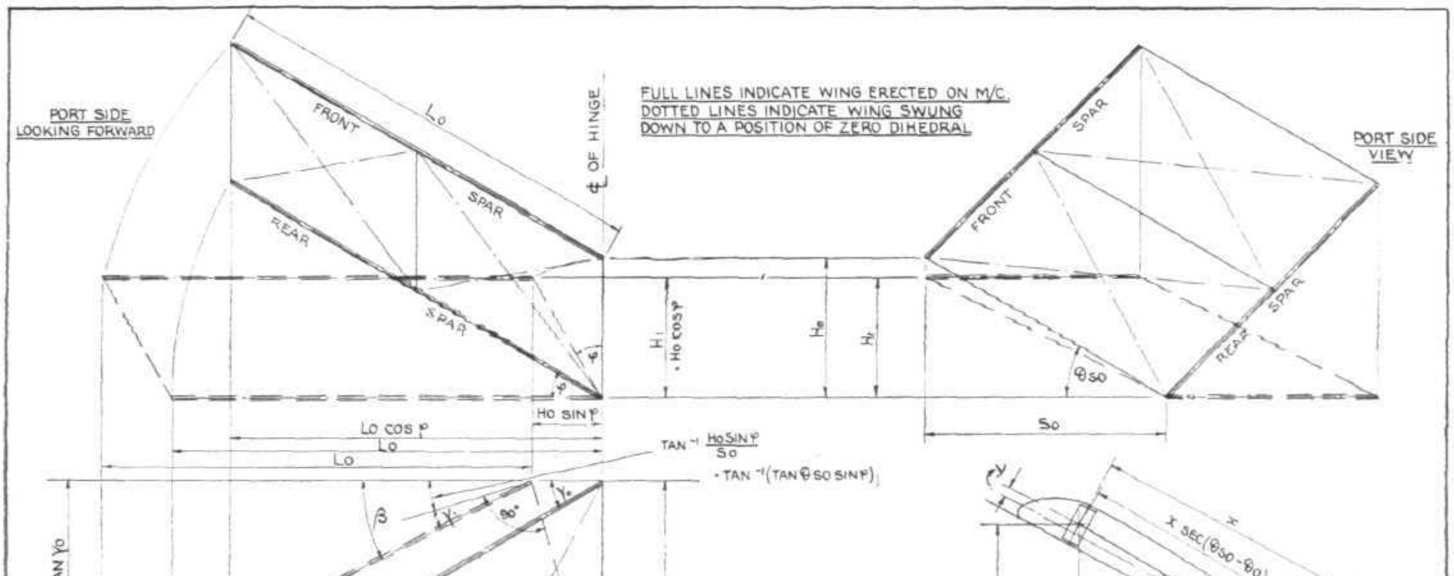
$$\theta_1 = \theta_{s1} - (\theta_{so} - \theta_o) = \theta_o + \theta_{s1} - \theta_{so}$$

$$\theta_{s1} = \tan^{-1}\frac{H_1}{S_1}$$

$$\gamma_1 = \beta - \tan^{-1}(\tan\theta_{so}\sin\phi) = \tan^{-1}(\cos\phi\tan\gamma_o) - \tan^{-1}(\tan\theta_{so}\sin\phi)$$

$$S_1 = H_o\sin\phi\operatorname{cosec}\left(\tan^{-1}\frac{H_o\sin\phi}{S_o}\right)\text{ or }\sqrt{(S_o^2 + H_o^2\sin^2\phi)}$$

$$H_1 = H_o\cos\phi$$
$$L_1 = L_o\sec\beta = L_o\sec[\tan^{-1}(\cos\phi\tan\gamma_o)]$$



In the case of sweepback, the effect of spar incidence, if neglected, may even be sufficient to upset the fore-and-aft trim of the machine, by giving an incorrect amount of sweepback when erected.

The following formulæ are arranged to correct these effects, and being non-dimensional, can be adopted as standard for all machines :—

let θ_o = The aerofoil incidence angle
θ_{so} = The spar incidence angle
ϕ = The dihedral angle
γ_o = The sweepback angle
S_o = The horizontal spar-centre distance
H_o = The vertical spar-centre distance
L_o = The spar length in front elevation

} when the machine is erected

N.B.—It is assumed that the ribs will always be assembled in such a manner that they will be truly fore-and-aft when erected.

These may be summarised thus :—

θ_1 = Aerofoil incidence $= \theta_o + \theta_{s1} - \theta_{so}$

θ_{s1} = Spar incidence $= \tan^{-1}\dfrac{H_1}{S_1}$

γ_1 = Sweepback $= \tan^{-1}(\cos\phi\tan\gamma_o) - \tan^{-1}(\tan\theta_{so}\sin\phi)$

S_1 = Horizontal spar-centre distance $= \sqrt{(S_o^2 + H_o^2\sin^2\phi)}$

and

H_1 = Vertical spar-centre distance $= H_o\cos\phi$

Also β = true angle between longitudinal centre line of spar and the normal to the axis of the locking pin $= \tan^{-1}(\cos\phi\tan\gamma_o)$.

x = the spar-centre distance parallel to the chord line

y = the spar-centre distance normal to the chord line

$x\sec(\theta_{so} - \theta_o)$ = the true spar-centre distance along the rib.

and L_1 = the true spar length =

$$L_0 \sec [\tan^{-1} (\cos \phi \tan \gamma_0)]$$

Though some of the corrections will always be negligible, it is necessary to carry the working to its logical conclusion, as it will not generally be apparent at the outset which factors need, and which need not be taken into account.

TECHNICAL LITERATURE.

AIRPLANE DESIGN—AERODYNAMICS.*

This book, by Edward P. Warner, Professor of Aeronautical Engineering at the Massachusetts Institute of Technology, and Assistant Secretary for Aeronautics of the U.S. Navy, is written by one who has had extensive experience of teaching, and the method employed in this book is largely the result of this experience. The topics treated are not uniformly characterised by immediate availability of practical application. Matter of abstract or academic interest is introduced where, but only where, it will round out the picture of aerodynamic development. In his preface the author states that "Bare formulæ without explanation, to be applied by rote, have been avoided where possible, but even a crude picture of the physical phenomena which can be tied up to the formula, and from the adoption of which by assumption the formula could be reproduced if forgotten, has been accepted in lieu of complete analytical treatment."

The book is divided into three parts, of which Part I deals with the general problems of lift and resistance; Part II with parasite drag and performance calculations in general; Part III with stability, controllability and manœuvrability. The 25 chapters into which the book is divided deal with the following subjects: I: Introduction and nomenclature. II: Some general principles. III: General considerations on aerofoils. IV: The qualities of an aerofoil. V: Aerofoil sections. VI: Effects of plan form on aerofoil performance. VII: Aerofoil combinations. VIII: Variable-lift aerofoil arrangements. IX: Effects of miscellaneous aerofoil phenomena. X: Scale effect. XI: Parasite drag. XII: Construction of performance curves. XIII: Effects of altitude. XIV: Speed and climb calculations. XV: Induced drag in performance calculations. XVI: Performance formulæ and charts. XVII: Stability. XVIII: Statical longitudinal stability and balance. XIX: Factors affecting statical longitudinal stability. XX: Free-flight stability criteria. XXI: Dynamic longitudinal stability. XXII: Lateral stability. XXIII: Controls and controllability. XXIV: Manœuvrability. XXV: Spinning.

The new book by Professor Warner is thoroughly up-to-date, and in addition to its other merits it takes into account modern theory and the possibility of splitting up wing drag into profile drag and induced drag.

Although not fundamentally affecting performance calculations, this division of the drag affords a considerable simplification. Also it affords a somewhat clearer physical conception. Professor Warner does not go into detail concerning modern aerofoil theory, for which the reader is referred to more specialised works on this subject, but he takes full advantage of everything that the theory can do to help in ordinary design work by explaining in considerable detail the practical application of the theory to actual design. Throughout, the book is illustrated by excellent diagrams, and is very clearly printed. Copious references are given in the form of footnotes all through the book, so that those who desire to study any particular subject in greater detail, or to verify the proof of certain statements or assumptions, will have no difficulty in finding several sources.

One feature of the book may present some little difficulty to the British student. Professor Warner uses the coefficients employed as standard by the U.S. Navy and Army, which are the British "absolute" coefficients multiplied by 0·0051 (the value of ρ when using feet, pounds, and miles units). In other words, he uses, except in certain cases explained in the book, pounds, square feet and miles per hour units at 1 m.p.h. Thus, in examples given one finds, for instance, a maximum lift coefficient of 0·00261, which at first sight will convey very little to a British student accustomed to our "absolute" lift coefficients. That coefficient, however, is merely our "absolute" coefficient multiplied by 0·0051. What tends still further to confuse the unwary is that American National Advisory Committee Reports make use of the same "absolute" coefficients as ours, with the exception that they use $\rho/2$ where we use ρ, with the result that the "absolute" coefficients of these reports are twice the value of ours. To bring the coefficients used by Professor Warner to our "absolute" coefficients, it is necessary to multiply by 196. In merely reading the book, it is sufficient, when it is only desired to get a rough equivalent in our customary units, to imagine the decimal point shifted two places to the right and then multiply the figure in the book by 2. All this may sound rather terrifying, but in point of fact Professor Warner gives a very good explanation of the various systems of units and on page 27 a table of conversion factors by the use of which it becomes very easy to convert from any one kind of recognized unit to any other. This table takes into account the units used in America, England, France and Germany, so that the student will, after studying this section of the book, find little difficulty in making use of information contained in works using units with which he may hitherto have been unfamiliar.

As the book has for its main title "Airplane Design," with "Aerodynamics" as a sub-title, perhaps it may be hoped that a second volume will follow, dealing with structural design. The first volume is one which deserve a place in every designing office in this country, and firms who are desirous of making their designing staffs as efficient as possible would do well to obtain several copies in order that those members of the staff concerned in aerodynamic design might study the book at leisure. As a work of reference, Professor Warner's book suffers, perhaps, somewhat from its arrangement, which was planned for a different purpose, *i.e.*, that of forming a text-book on the subject of aerodynamic design. In the latter capacity, however, it would be difficult to improve upon it.

AN INTRODUCTION TO THEORETICAL AERODYNAMICS.*

Almost all works on modern aerodynamics have been written by mathematicians or theoretical physicists, and have presupposed in their readers a knowledge of classic hydrodynamics. Also such works have, in the main, gone considerably further than is necessary to the reader who wants merely a "working knowledge" of the subject. The book just published by R. Oldenbourg, of Munich, by Professor C. Eberhardt, entitled "Einführung in die Theoretische Aerodynamik," treats the subject in a rather simpler manner, as one would expect from its title, and does not demand of its reader nearly such an extensive knowledge of either hydrodynamics or mathematics. In his preface the author states: "It was clear to me that the manner of my representation of the hydrodynamic theory would not in all cases meet with the approval of professional theorists. To that I would point out that we engineers are frequently compelled, in view of other problems with which we are faced, to seek other ways and means in order quickly to reach our goal." This book, then, is an introduction to the study of aerodynamics, and although not "light reading," does not make the demands on the reader from which the majority of works on this subject suffer. From the point of view of the British readers, the fact that it is in German will, unfortunately, be likely to prove a stumbling block, although those with such knowledge of the language as is acquired at school, and with a certain grounding in the subject of aerodynamics generally, should be able, with the aid of a dictionary, to

* Airplane Design—Aerodynamics by Professor Edward P. Warner, McGraw-Hill Publishing Co., Ltd., 6 & 8 Bouverie Street, London, E.C.4. Price 37s. 6d. net.

* Einführung in die Theoretische Aerodynamik, By Dipl.-Ing. C. Eberhardt, Professor of Aeronautical Engineering at the Technical High School, Darmstadt. Published by R. Oldenbourg, of Munich. Price 9 Mark 50.

follow closely the explanations and arguments of the author. The book is excellently illustrated by diagrams, and a few photographs of streamline flow, etc.

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS.

FULL SCALE TEST OF SLOT AND AILERON CONTROL ON A WOODCOCK.

By H. L. STEVENS, B.A.

(Presented by the Director of Scientific Research.)

R. & M. No. 1089. (Ae. 268.) (2 pages and 3 diagrams.) February, 1927. Price 4*d.* net.

The slot and aileron control has now been fitted to a number of aeroplanes for experimental purposes and has after modification proved satisfactory in each case. The present report describes an experiment on the standard Woodcock fitted with slot and aileron control by the makers after consultation with the R.A.E.

The lateral control in normal and in stalled flight has been tried with various values of the gearing between control column and aileron, and between aileron and auxiliary aerofoil.

With the final gearings selected it is considered that the Woodcock has been considerably improved both in normal and stalled flight. It is more manœuvrable and there is no unpleasantness in the feel. In stalled flight a wing can be lifted without the use of the rudder, though at the expense of some yaw.

FURTHER WIND TUNNEL TESTS OF A SLOT AND AILERON CONTROL ON A WING OF R.A.F. 31 SECTION.

By A. S. HARTSHORN, B.Sc.

(Presented by the Director of Scientific Research.)

R. & M. No. 1090. (Ae. 269.) (9 pages and 9 diagrams.) February, 1927. Price 9*d.* net.

This report describes a continuation of the tests of R.A.F. 31 Section described in R. & M. 1048* in which the combinations of a slotted leading edge with four different types of aileron flap were investigated. The present experiment was carried out to obtain results at higher Reynold's Number.

The measurements were confined to the case of the slotted rear flap of R. & M. 1048, and rolling and yawing moments were measured over an LV range of 33 to 132.

The method developed permits the measurements of rolling and yawing moments about any arbitrary body axis, and the maximum LV scale has been raised from 33 to 132. The balance is particularly suitable for a rapid exploration over an incidence range. Compared with the previous method the readings can be made with much greater rapidity, and certain errors due to instability of flow have been eliminated, but the accuracy of steady readings is reduced. The actual measurements made show that the irregularities noted previously for R.A.F. 31 still persist at the highest LV tested, and owing to the erratic variation with speed no indications can be found as to full-scale conditions.

Further experiments are proceeding on R.A.F. 31 to develop a slot control which will have a low drag at high speeds of flight, and will be automatic in action.

* R. & M. 1048.—Slot and aileron control on a wing of R.A.F. 31 section, with various types of ailerons.—By F. B. Bradfield and A. S. Hartshorn.

A NON-DIMENSIONAL FORM OF THE STABILITY EQUATIONS OF AN AEROPLANE.

By H. GLAUERT, M.A.

(Presented by the Director of Scientific Research.)

R. & M. No. 1093. (Ae. 272.) (10 pages.) March, 1927. Price 6*d.* net.

The determination of the longitudinal or lateral stability of the rectilinear motion of an aeroplane is based on the method of analysis introduced by Professor G. H. Bryan,* and the calculations are usually made by inserting the actual values of the stability derivatives into the stability equations. Non-dimensional coefficients for the various stability derivatives were proposed by the Technical Terms Committee of the Royal Aeronautical Society, and some of these coefficients are now in use. A non-dimensional treatment of the stability equations was also proposed by Professor B. M. Jones, in 1921, but the scheme was open to various objections and has not been generally adopted.

The comparison of the stability criteria of different aeroplanes would be greatly facilitated by the introduction of a non-dimensional treatment of the stability equations.

A non-dimensional system is developed in which the derivative coefficients have the simplest possible forms, while the resulting stability equation involves only one other parameter in addition to these coefficients. A few notes are added on the principal forms of instability which may occur with an aeroplane of normal type.

A general analysis of the longitudinal stability of an aeroplane, developed in the non-dimensional system, will form the subject of a separate report.

* Stability in Aviation.

THEORETICAL RELATIONSHIPS FOR AN AEROFOIL WITH HINGED FLAP.

By H. GLAUERT, M.A.

(Presented by the Director of Scientific Research.)

R. & M. No. 1095. (Ae. 274.) (13 pages and 4 diagrams.) April, 1927. Price 9*d.* net.

The use of an aerofoil with a hinged flap is of very general importance both for control surfaces and for main supporting surfaces, and in particular information is required as to the effect of varying the size of the flap. Hitherto, it has been customary to rely wholly on experimental results, but theoretical expressions for the lift and pitching moment in two dimensional motion are given in report R. & M. 910.*

The analysis has now been extended in an improved manner, to cover also the hinge moment and the case of rectangular aerofoils of finite span.

The theoretical values appear to be in very satisfactory agreement with experimental results, and so the theoretical formulæ may be used with confidence to predict the effect of variation of the size of flap or of the aspect ratio of the aerofoil.

* A theory of thin aerofoils.—H. Glauert, R.A.E.

A FULL-SCALE DETERMINATION OF THE ANGLE OF DOWNWASH BELOW AN AEROPLANE.

By E. T. JONES, M.Eng.

(Presented by the Director of Scientific Research.)

R. & M. No. 1094. (Ae. 273.) (6 pages and 2 diagrams.) April, 1927. Price 6*d.* net.

The suspended flight path recorder, described in R. & M. No. 1049,* has been used to determine the downwash angle below the Bristol Fighter aeroplane, and incidentally to find the least length of supporting cable that is necessary for a sufficiently accurate determination of the angle of the flight path by this instrument.

The length of the cables supporting the instrument was varied from 10 to 100 ft., while a constant incidence of the aeroplane, corresponding to a lift coefficient of 0·38, was maintained.

The experimental results are in good agreement with the results of aerofoil theory over the whole range. It is, however, desirable to use a length of cable of at least 40 ft. in order to ensure that the error in the angle of the flight path when the theoretical correction due to downwash has been applied shall be negligible.

* The direct measurement of the angle of flight path of an aeroplane as a means of eliminating the effect of air currents on the measurements of lift and drag.—By E. T. Jones, M.Eng., and H. L. Stevens, B.A.

are similarly protected. The fuselage is built in two sections, bolted together, the joint being covered with a glued-on fabric strip. The roof of the cabin forms another unit, bolted and screwed to the top longerons, which can be removed for repairs or when a thorough inspection of the fuselage structure is required.

The installation of the "Jupiter VI" engine is of very simple type, the engine plate being of Duralumin, supported on steel tube members. The whole unit is detachable from the fuselage by undoing four bolts at the corners, the structure remaining being a complete and rigid unit without loose parts. The petrol supply is of the simple gravity feed type, the centre-section of the top plane forming the petrol tank with a capacity of 80 gallons. This centre-section is situated, slightly higher than the two halves of the top plane, so that when the wings are folded the trailing edges of the top plane can pass under the centre-section tank, thus avoiding any complication in the design of the corners of the top plane.

The oil tank is made in one with the top cowling, making one unit instead of two, and one mounting common to both. The oil cooler is mounted direct on the top of the tank. The oil temperature gauge is inserted in the sump alongside the outlet to the engine, so that the correct temperature should be recorded. A cock is provided which must be turned off when the machine is standing, and to avoid the danger of starting without turning this cock on, a magneto earthing switch is arranged to cut out the magneto when the oil is turned off.

The wings are mainly of wood construction, but have metal drag struts. All drag wires are connected direct to the ends of the struts, so that cross-grain shrinkage does not affect their adjustment for tautness. The ribs are made a floating fit on the spars, metal tracks and leading edges being employed. Provided the wings are rigged according to instructions, there is no need for jury struts when folding the wings.

The undercarriage of the D.H.61 is of somewhat unusual type, in that there is no axle. This type of undercarriage has become very popular in America, as it has been found that it gives less tendency for the machine to "nose over" when alighting on rough ground, in tall grass, or corn. Instead of the usual type, however, quite a different arrangement has been evolved, the general scheme of which will be clear from the sketch on page 880. The usual vee on each side, *i.e.*, the telescopic compression "leg" and the "radius rod," are rigidly fixed together at their lower ends, the lower tube of the telescopic "leg" carrying the wheel being overhung as a cantilever from the point where it emerges from the upper tube to the wheel. The structure on each side is completed by a transverse diagonal strut running to the longeron on the opposite side. With this arrangement, the angle of the diagonal struts is very good, while a wide wheel track is provided, and the bend in the axle tube is not so sharp. Springing is by rubber blocks in compression, and the blocks are lightly loaded so as to prevent them being over-compressed, with consequent hardening. All working points are provided with "Tecalemit" grease gun nipples, with the exception of the telescopic tubes, which are lubricated by oil fed through oil cups at the top of the "legs."

The cabin of the D.H.61 is of generous proportions, the width being no less than 4 ft., so that two passengers sit side by side very comfortably indeed, while if desired, it is possible to carry three side by side, although the accommodation is then slightly cramped. The sofa seats are arranged across the cabin against the front and rear walls, and two bucket "seats" are placed in the middle of the cabin, between the two others. There is a space between them, so that passengers can get to the front sofa seat easily.

The pilot's cockpit, an extraordinarily roomy one, by the way, is placed well aft of the wings and cabin, and extends upward into a sort of "conning tower." It might have been thought that the view, with such a wide fuselage in front, would have been rather poor. As a matter of fact, it is very much better than one would expect, and only in dropping the tail to land is it obstructed to any serious extent. However, even then, by looking diagonally, instead of straight forward, the pilot can easily see the ground ahead. He will already have made sure, in gliding in to land, that the ground straight ahead is clear. The advantage of having the pilot aft is that the trim remains unchanged, so that it is never necessary to carry useless ballast to trim the machine. Cynics might say that also this is a very safe place for the pilot in a crash, so that he would probably live to relate what went wrong! A small window between cabin and cockpit permits of communication between pilot and passengers.

The luggage space provided is on an unusually generous plan, one compartment being situated ahead of the cabin, large enough to hold a couple of cabin trunks, while a smaller compartment is under the pilot's cockpit. In the cabin there are spaces for light hand luggage in the forward wall, and two smaller recesses in the aft wall.

Altogether, the de Havilland 61 is one of the most comfortable of modern aeroplanes, and it deserves to become very widely used in localities where a medium power machine suffices for the amount of traffic obtainable.

The main characteristics of the machine are :—

Total loaded weight ..	6,200 lbs. (2,280 kgs.).
Paying Load	1,900 lbs. (864 kgs.).
Petrol	80 gallons ($4\frac{1}{2}$ hours' cruising).
Wing area	613 sq. ft. (57 sq. m.).
Wing loading ..	10·1 lbs./sq. ft. (49·5 kg./sq. m.).
Power loading ..	13·8 lbs. (6·27 kgs.) per h.p.
"Wing power" ..	0·734 h.p./sq. ft. (7·9 h.p./sq. m.).
Span loading (biplane)	0·436.
Top speed	126 m.p.h. (203 km./h.).
Cruising Speed ..	105–110 m.p.h. (170–177 km. h.).
Stalling speed, about	47 m.p.h. (76 km./h.).
Rate of climb.. ..	650 ft./min. (3·3 m. per second).
Ceiling..	15,000 ft. (4,570 m.).

Everling Quantities (Metric Units).

"High-speed figure"	19
"Distance figure" (top speed)	4·8
"Altitude figure" (ceiling)	8·9

While the "Distance figure" is of about average value, the "High-speed figure" and "Altitude figure" are both unusually high, especially the former, which is far above the average.

Col. L'Estrange Malone for Parliament

COL. L'ESTRANGE MALONE, who was one of the first naval officers to be selected for a course of flying at Eastchurch in 1911, has been adopted as prospective Labour candidate for Northampton.

Seen from the Air

PASSENGERS in air liners frequently see interesting "happenings" from the air. For instance, the passengers in one of Imperial Airways cross-Channel machines recently saw a large whale, apparently dead, floating in the water, almost entirely covered with seagulls. On the occasion of Miss Gleitze's last attempt to swim the Channel, an excellent view was obtained of the swim from one of the Imperial Airways machines. Again, just recently an Imperial Airways pilot reported that while flying above an unbroken bank of fog in the sunshine he spotted a number of birds flying, also above the fog, towards the south in arrow formation.

Sir W. G. Armstrong Whitworth and Co.'s New Board

THE new board of Sir W. G. Armstrong Whitworth and Co., Ltd., has been constituted as follows :—Lord Southborough, Sir Eustace Tennyson d'Eyncourt, Mr. J. Ferguson, Sir George Hadcock, Mr. J. Hawson, C. A. Lieut.-Col. C. F. Hitchins, Mr. B. Irving, Mr. J. D. Siddeley, Mr. J. Stewart, and Mr. J. Frater Taylor.

An Air Force Cinema

THE R.A.F. has a cinema at Uxbridge which they have had permission from the Air Council to run as a commercial concern. It is in rivalry with local cinemas and is therefore causing certain local criticism.

At Dizzy Heights

A BRISTOL "Bulldog" machine which is equipped with a Bristol "Jupiter" engine will shortly be used for research work at great altitudes. The pilot will probably be Flt.-Lieut. J. A. Gray. The machine is now at the Royal Aircraft Establishment, Farnborough.

Capt. Courtney : Change of Address

THE office address of Capt. F. T. Courtney, the well-known test pilot, has been changed to Dacre House, Arundel Street, Strand, London, W.C.2. Telephone : City 9521.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the fund was held at Iddesleigh House on December 20. Lieut.-Commander H. E. Perrin was in the Chair, and the other member of the committee present was Mrs. L. M. K. Pratt-Barlow, O.B.E. The committee considered in all 16 cases, and made grants to the amount of £335 6*s*. The next meeting was fixed for Thursday, January 12, at 2.30 p.m.

PRIVATE  FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

THE JOYS OF JOY-RIDING

WHEN serving on R.N.A.S. stations along the coasts during the war, we occasionally had the job of ferrying new Short seaplanes from one base to another, particularly if attached to a central base. It was an experience that was usually liked and desired, for ferrying was often of the nature of joy-riding and a decided change from the monotony of five and six-hour sea patrols searching for something that persisted in being elsewhere. Often it meant visiting a new station where one was bound to meet fellows with whom one had passed out at Cranwell, and not seen since. Sometimes a week-end was involved with its happy freedom from home discipline. At one big air station on the Channel where I served, observers were very keen on these trips, and it was necessary to allot them in alphabetical order. In spite of this, it was absolutely essential to be prepared for your turn, otherwise it would be quickly and unscrupulously usurped.

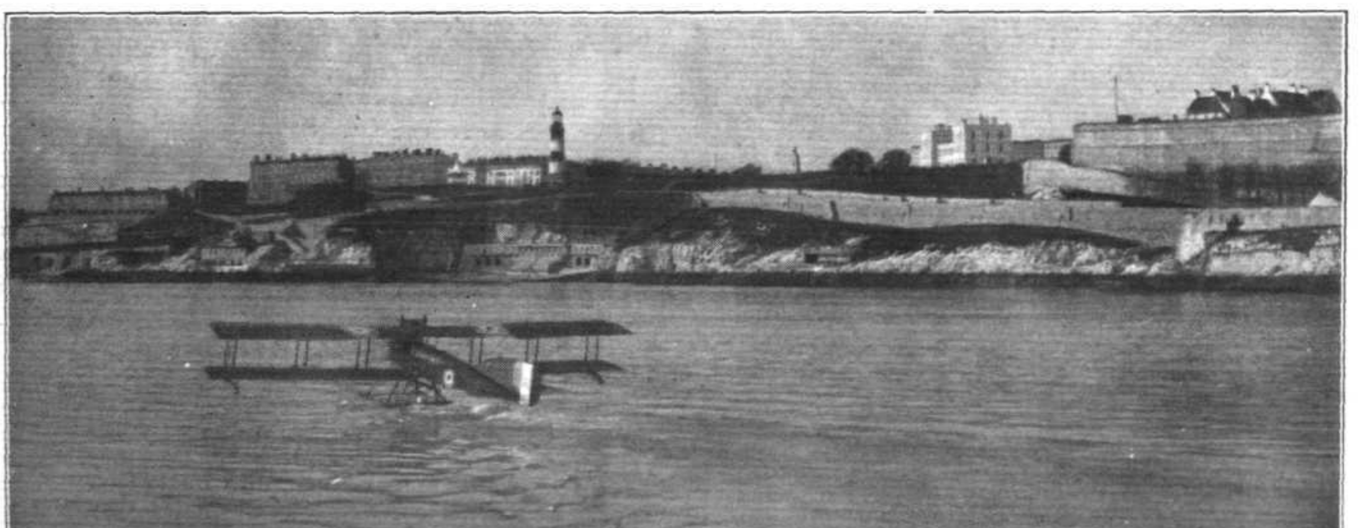
I was very anxious for my first experience of ferrying, and when my turn came I prowled the breakwater the whole day waiting for a fog to lift, which had delayed it. It was so thick that visibility was not more than twenty yards, but I was afraid it might lift suddenly if I went away, and I should be caught napping. I only gave in when dusk set in and my machine was housed safely with folded wings for the night. The next day I was on the breakwater early, and although the fog was still thick, all that morning I still clung tenaciously. In the afternoon a "make-and-mend" (naval half-holiday) was unexpectedly announced for the whole station; then only did I drag myself away, because I felt secure from usurpation. We spent most "make-and-mends" piping down until the evening, because there was nothing else to do. I was no exception to the rule, and about 4 p.m. I was suddenly awakened by a mechanic and told the alarming news that my pilot was awaiting me.

I made such frantic preparations that when I climbed into the rear cockpit three minutes later, I was only dressed for flying and had not prepared for a probable week-end away at another station.

We took off in the harbour which gleamed wonderfully fresh and bright after being hidden by fog for so long, and rose seawards over the Channel, that also looked as though it had been cleaned. Turning west over the headland, we commenced to follow the coast for our destination that lay 100 miles away. Although this coast formed part of the area which I daily patrolled, I had never had time to note its points of interest, and this I was now looking forward to doing. I had no duties beyond transmitting one wireless message to my base, making known our departure, and one to our destination later on informing them of our approach. When the first message had been sent, I settled myself comfortably and observed the rugged coast where a curling white fringe of foam crawled round the sands. Visibility was good, and I could see the country through the starboard wings stretching for miles towards a faint row of blue hills.

We had not been flying more than ten minutes when the wind vane on the petrol pump stopped. The pilot turned and asked me to operate the auxiliary pump situated very awkwardly in my cockpit, although its position was unavoidable. It was difficult to pump without rubbing the skin off one's hand against the inside of the fuselage fabric. Altogether, it was an uncomfortable and strenuous job, for six strokes wearied the arm completely. Unfortunately, it was not possible to relieve the right arm either. When I had restored the pressure I gladly ceased, but I found that this brought an almost instant inquiring glance from the pilot and a wry expression. Finally, I realised it was necessary to pump almost continuously. Thus, as the invisible coast slowly passed by, I spent this "joy-ride" down in the congested depths of the cockpit, pumping away with an arm that simply refused to go every few minutes. I missed all my points of interest on the coast and said a lot of things about petrol systems, pilots, and life on the ocean wave.

At last I silently but resolutely revolted and flopped back into my seat for fresh air and a sight of the passing world, not caring if the wings dropped off. Very conveniently for the pilot, we were near our destination now, which lay in the corner of a large bay, and we managed to keep running until landing.



This is a war-time picture of a Short seaplane leaving Plymouth Sound for a submarine patrol in the Channel. Plymouth Hoe is very distinctive in the centre. These Short seaplanes were widely used for sea patrols all round our coasts. They were fitted with 225 h.p. Sunbeam engines, carried two bombs (250 and 100 lb.), complete wireless equipment, and a crew of two. Their range was over 6 hours, and they were noted for extreme stability.

We taxied to a slipway and hedged on to a trolley. There was a small group of pilots and mechanics watching our arrival. I was bending down in the cockpit gathering my gear together when a ringing authoritative voice suddenly cried :—

"Why didn't you answer our wireless signals as you came down the coast? We heard you call your own station on leaving, but you ignored us entirely."

Now at that age in my life I had not learned to be tolerant before an injustice, and so I rose up quickly, prepared to slay that unknown person with ready invective, but, by good fortune, my eye was suddenly arrested by an arm resting on the side of the fuselage conspicuously adorned with two gold rings and two gold stars—Squadron Commander! My intention, however, had been obvious, and I was too confused to splutter out even the justified excuse.

"You have a new receiver in that machine, haven't you?" he demanded.

"No, Sir," I replied, avoiding his steely glance.

"Why haven't you?" he thundered. The grinning mechanics were forming a discreet audience. "The machine is perfectly new and must have been equipped with new wireless apparatus when it arrived at your station. What is the reason for bringing down an old receiver in a new machine?"

Although I knew, I dare not say. But he knew.

"I know," he snapped. "Your station has developed the habit of taking out this new apparatus when these machines arrive and passing them on to us with your old stuff."

With that he stalked away with an expression that foreboded harm to someone in the future. His surmise was quite correct. We counted it our privilege, as the chief base in our area, to take possession of the new gear and pass on the old.

This was the actual end of my "joy-ride," and I was very thankful, but another incident occurred before reaching the safety of my own base again which was equally disconcerting, although its climax was more of a relief.

I returned back alone, by train, the next day, which was Sunday, as my pilot was detained for another day in connection with ferrying. In my compartment there were just two middle-aged R.N. warrant officers beside myself, and they seemed strangely and persistently interested in me, which eventually became very embarrassing. Their attention was divided between my appearance and the miscellaneous nature of the bundle at my side. This was my own gear that I habitually used when flying and was now bringing back with me. It consisted of my Perrin's lifebelt, which we always wore when flying at sea, flying helmet, wireless telephones, signalling lamp and battery, charts and code book. In my haste when leaving my base, I had, of course, brought no clothes other than those I now wore, which were simply a thick blue jersey and blue slacks. I had no cap even. On considering their curiosity, I realised that I probably looked a strange and unusual sight for a Service fellow travelling in public, but that did not seem to me to justify their utter mystification that they made poor attempts to conceal.

That journey took about two hours, and this intensely annoying situation lasted the whole time. At last, when I was near my destination, their curiosity apparently got the better of them, and one of them suddenly leaned towards me and said, quite seriously and sincerely:

"Excuse me, sir, have you been shipwrecked?"

LIGHT 'PLANE CLUBS: Owing to Christmas holidays the weekly Light 'Plane Club reports are held over until next week.

Australian News

THE Sydney Club's monthly publication, aptly entitled *The Fly Paper*, has been issued for November in a new form, like a small newspaper. It is an excellent change from the mimeographed sheets, although the contents of these were always very interesting. The three-quarter front-view drawing of the "Moth" is still retained as the illustrated heading, with the paper's title boldly printed on the side of the fuselage. It is very effective. We would suggest, though, that the paper would be more readily identified if the name of the club was also indicated on the front page, for as it is now a new reader will have to wander through the contents before he knews whom it concerns.

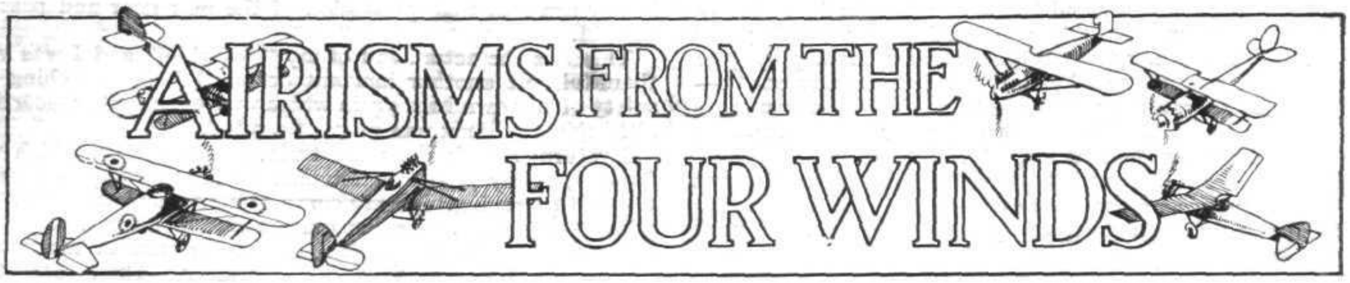
The club records with regret the sad loss of Mrs. Millicent M. Bryant, who was drowned in the recent ferry-boat disaster in Sydney Harbour. Not only was Mrs. Bryant one of the first members of the club, but she was the first woman pilot in Australia, despite the fact that her age was over 48 when she commenced to fly. So the club's loss is equally Australia's. Club machines flew over, and a wreath was dropped on the grave at her funeral on November 5.

A complete reconditioning of the club's machines has been done, and flying was recommenced with all five "Moths" in most excellent condition. In 15 months' hard flying over 1,650 hours had been done. The Civil Aviation Department has been asked for the loan of another "Moth." The flying hours per week sometimes amount to nearly fifty. There are two instructors.

Avro "Avian" (Cirrus) Creates a Record

CAPT. LANCASTER and Mrs. Keith Miller have now set up a long-distance record for light aeroplanes in the course of their attempt to reach Australia in an Avro "Avian." On December 22 they covered 300 miles after leaving Akyab, but were forced to make a landing in a rice-field just before reaching the end of the stage to Rangoon. Neither of them were hurt, and they went on to Rangoon by road. They have travelled well over 9,000 miles now. Lieut. Bentley, A.F.C., previously held the record with his 8,000-mile flight to Cape Town in a D.H. "Moth." The extra distinction of Capt. Lancaster's record is that he carries a passenger besides extra fuel. The detail weights of his "Red Rose" are: tare weight, 930 lbs.; pilot, 154 lbs.; passenger, 114 lbs.; petrol (56 galls.), 420 lbs.; oil (4 galls.), 40 lbs.; spares, 34 lbs.; personal kit, 12 lbs.; maps, 12 lbs.; firearms and ammunition, 8 lbs.; desert rations, 2 lbs. The total loaded weight is 1,726 lbs. He left Croydon on October 14 and has covered the distance at approximately the same rate as Lieut. Bentley's "Moth." The pilot has sent excellent reports on the machine and the "Cirrus" 32-80 h.p. engine from time to time, and mentioned that he was nursing his engine until he reached Rangoon. Progress has been regular except for an enforced week's quarantine at Basra owing to an outbreak of cholera.

Miss W. E. Spooner, a private owner of a "Moth" and a member of the London Aeroplane Club with whom she graduated, recently flew her machine to Chard, Somerset, to visit her brother, Capt. Spooner. She is seen here standing by her machine at Chard.



Great Flying-Boat Cruise

THE four R.A.F. "Southampton" flying-boats reached Mangalore, Madras, from Bombay on December 27. The 450 miles were covered in six hours and large crowds watched their arrival.

The "Singapore" Nearly Ready

SIR ALAN COBHAM hopes to re-start on his African survey flight from Malta with the New Year, a fortnight sooner than expected, for which credit is due to Messrs. Short Bros., who manufactured a new metal wing in two weeks to enable it to be transported by a steamer leaving for Malta on December 15.

Another Atlantic Tragedy?

MRS. F. GRAYSON left New York in her Sikorsky Amphibian, "The Dawn," on December 23 for Newfoundland, from where she intended to cross the Atlantic on Christmas Day. Nothing has been heard of her since she passed Cape Cod, except for a message which vaguely suggested that something was wrong. A minister in Newfoundland reported that a machine flew over his church going eastward towards the Atlantic on Christmas Day at 9.20 a.m. A wireless station at Newfoundland picked up some very loud messages the next day which asked for a location. Where they came from is not known, but if from "The Dawn" then it was very close. The distance from Cape Cod to Harbour Grace, Newfoundland, is 1,000 miles. Accompanying Mrs. Grayson were Lieut. Oskar Omdal, pilot; Mr. Brice Goldsborough, navigator; and Mr. F. Koehler, mechanic. The wife of Mr. Goldsborough financed an expedition with a cheque for £100, given her as a Christmas present, to make a search for the missing machine, but this proved fruitless. The expeditionary machine, a Curtiss amphibian, was flown by Mr. W. Winston and Mr. S. Parkinson, who reported good visibility over the whole course. Following the latest wireless message, it was proposed to make another search, while another, also unsuccessful, search was made by the "Los Angeles," the U.S. naval airship, as well. Mrs. Grayson had made many previous unsuccessful attempts during the last few months.

Sydney-Wellington Flight Planned

LIEUT. MONCRIEFF and Capt. Hood, of the New Zealand Air Force Reserve, propose to fly from Sydney to Wellington in a Ryan monoplane fitted with a 220 h.p. Wright "Whirlwind" engine; the type of machine in which Col. Lindbergh crossed the Atlantic. Their machine is now at Melbourne and will shortly make a trial flight to Sydney. The New Zealand Government has sanctioned this proposal but it will be financed by private subscription. The Australian Air Force is assisting the two airmen in every possible way.

Air Survey in Iraq

THE Aircraft Operating Company has received a contract from the Iraq Government for an air survey of 1,000 square miles close to Baghdad. The survey will commence in the Spring of next year.

French Test Pilot Killed

M. EDOUARD DE LAMOTHE, the chief pilot of the French aircraft firm of Lioré-Olivier, was killed on December 20, when testing a machine at Villacoublay. Whilst flying low the machine caught an electric cable and took fire, burning the pilot to death.

Latest American Bombers

FOUR of the leading American aircraft firms have each recently produced a new bombing machine which will shortly be tested by the U.S. Air Corps, who will chose one which will best suit the needs of the Service. One of these machines is the Sikorsky bomber, "Guardian," which left Roosevelt Field, Long Island, on December 17 on a test flight and made a forced landing through an engine defect at Aberdeen, Maryland. It was flying over the Southern Delaware when the trouble occurred and before the actual landing took place the load was lightened by the release of 500 gallons of petrol. It had intended flying to Washington and then Dayton, Ohio. On board were the designer, Mr. Ivor Sikorsky, three mechanics, and three passengers. Two other bombers submitted for the tests were the twin-engine Curtiss "Condor," which was torn from its moorings in a gale and wrecked during the recent storms in Buffalo, and a Fokker twin-engine monoplane. The fourth production will be the Keystone Super-Cyclops biplane, now ready for its tests at Bristol, Pennsylvania.

American Proposals.

MISS MYRTLE BROWN, sister-in-law of the Bellanca aircraft designer, is being financed for a flight from New York to Rome. A prize of £5,000 has been offered for a flight from New York to Cairo. Tentative arrangements for an international air meeting between Canada, Mexico, and the coastal air service on the Atlantic and Pacific sides of the United States are also being discussed.

Fokker Development

THE Fokker Aircraft Corporation has been formed with capital of £200,000 to build an aircraft factory at Glendale, West Virginia, to produce Fokker "Universals" and other machines on a quantity basis. This corporation has taken over the Atlantic Aircraft Corporation, of which M. Fokker was the chief designer and president, and Mr Lorillard Spencer has been adopted as the new president.

A New U.S. Air Mail Route

BIDS have been opened at the U.S. Post Office Department for the operation of a contract air mail route (daylight) between Salt Lake City, Utah, and Great Falls, Montana, via Pocatello, Idaho, Butte and Helena, Montana—a distance of 476 miles.

French Machine Located

THE Lioré et Olivier Le 025 military biplane, fitted with two 420 h.p. Gnome-Rhone-Jupiter engines, which left Rome at midnight on December 19 in the course of its flight from Paris to Hanoi, did not reach Athens as intended and was eventually located at Adalia, Asia Minor, a distance of 1,120 miles. Col. Antoinat was in command and has four companions. The machine is named "Georges Guynemer." They left for Aleppo on December 21.

The French Tour in South America

CAPT. COSTES and Lieut. Le Brix flew over the Andes from Santiago, Chile, to La Paz, Bolivia, a distance of 1,200 miles, in 12¼ hours on December 21. They are using their Breguet military biplane in which they crossed the South Atlantic a few months ago.

U.S. Naval Orders

THE Navy Department announces that it has contracted for 20 amphibian machines costing about £100,000.

New Spanish Air Service

ON December 14, a new air line between Madrid and Barcelona was opened in the presence of the King, the Marques de Estella, and many Ministers, at the Carabanchel aerodrome. Two German Rohrbach-Roland metal machines fitted with three 750 h.p. engines were blessed by the Bishop of Madrid and Alcala. The first machine made the trip to Barcelona in three hours, and the machine which made the opposite journey took over five hours, being delayed by fog.

This new service will operate daily, Sundays excepted, and provide an air link between Madrid and Berlin. It is being worked by a Spanish company, Iberia, in conjunction with the German Lufthansa. Leaving Madrid at 8.30 a.m., air travellers will reach Berlin the following day. The German machines will carry ten passengers besides a crew of four. Civil aviation in Spain is developing rapidly, and the Germans are said to be getting well established.

Italian Altitude Record

THE Italian airman, Signor Donati, reached an altitude of 38,802 ft., on December 22. The attempt was officially observed and will constitute a world's record if confirmed.

The National Pilots Association (U.S.A.)

THE organisation formerly known as the Air-Mail Pilots of America has been reorganised as the National Pilots' Association, and now includes all air pilots, mail and otherwise.

Christmas Greetings

THE Editor desires to tender his sincere thanks to the numerous FLIGHT readers who sent Christmas Greetings and New Year Good Wishes. These are greatly appreciated as forming an intimate link between FLIGHT Staff and those for whom they cater week in and week out, year by year.

THE ROYAL AIR FORCE

London Gazette, December 20, 1927.
General Duties Branch

The follg. are granted short service commns. as Pilot Officers on probation, with effect from, and with seny. of, Dec. 9:—R. R. Carroll, R. A. Chignell, D. S. Collins, F. B. S. Downey (Sec. Lieut., D.L.I., T.A.), H. G. Hamilton, J. E. McCann, J. F. Macdonald (Sec. Lieut., H.L.I., T.A.), D. Menzies, G. F. Overbury, J. D. Richardson, J. L. Smallwood, F. L. Truman, S. R. Ubee. The follg. Pilot Officers on probation are confirmed in rank:—A. K. K. Calwell; Sept. 18. M. Griffiths, C. K. T. Hughes; Sept. 29.

The short service commn. of Pilot Officer on probation T. A. D. Hetherington is terminated on cessation of duty; Dec. 21.

Medical Branch

Flying Officer (Temp. Lieut., Dental Surgeon, General List, Army) H. J. Eagleson is dismissed the Service by sentence of General Court-Martial; Dec. 12.

RESERVE OF AIR FORCE OFFICERS
General Duties Branch

The follg. are granted commns. in the Special Reserve as Pilot Officers on probation:—J. S. Davidson; Nov. 21. G. D. S. Horsfall; Nov. 25. Flying Officer J. V. Hay is transferred from Class B to Class C; Sept. 18.

The follg. Flying Officers relinquish their commns. on completion of service:—K. Don; Mar. 25. H. Jones; Dec. 16. The follg. Flying Officers relinquish their commissions on completion of service, and are permitted to retain their rank:—W. E. Townsend; Oct. 24. W. J. Cooke; Dec. 5. Flying Officer G. S. Smith, M.B.E., relinquishes his commn. on account of ill-health and is permitted to retain his rank; Nov. 9.

AUXILIARY AIR FORCE
Accountant Branch

No. 602 City of Glasgow (Bombing) Sqdn.—Pilot Officer H. G. Davidson resigns his commn.; Dec. 21.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch.

Wing Commanders: G. I. Carmichael, D.S.O., A.F.C., to H.Q., India, for Staff Course at Staff Coll, Quetta, 3.1.28. E. R. Manning, D.S.O., M.C., to R.A.F. Depot, Uxbridge, for Administrative duties, 6.12.27. G. B. Hynes, D.S.O., to Air Ministry, Directorate of Aeron. Inspection, for duty as Chief Inspector (Engines), 19.12.27.

Squadron Leaders: C. B. Cooke, to No. 503 Sqdn., Waddington 29.11.27. T. W. Elsdon, to R.A.F. Training Base, Leuchars, 5.12.27. A. R. Arnold, D.S.C., A.F.C., to R.A.F. Depot, Uxbridge, instead of to No. 9 Sqdn., as previously notified, 12.12.27.

Flight Lieutenants: R. L. Sweeny, to Elec. and Wireless Sch., Flowerdown, 22.12.27. N. V. Moreton, to No. 16 Sqdn., Old Sarum, 28.1.28. R. M. Davy, and G. McCormack, to No. 14 Sqdn., Middle East, 2.12.27. I. E. Brodie to No. 27 Sqdn., India, 14.11.27. D. F. Anderson, D.F.C., to H.Q., India, 6.12.27. J. B. H. Rogers, to Aircraft Depot, India, 13.11.27. V. Buxton O.B.E., and T. C. Luke, M.C., to No. 45 Sqdn., Middle East, 23.11.27.

Flight Lieutenants: E. Brewerton, D.F.C., to No. 29 Sqdn., Duxford; 1.1.28. R. S. Sugden, A.F.C., to No. 502 Ulster (B) Sqdn., Aldergrove; 20.12.27. H. S. P. Walmsley, M.C., D.F.C., to No. 503 (B.) Sqdn, Waddington; 20.12.27, G. G. Banting, to No. 5 Flying Training Sch., Sealand; 20.12.27. G. Archer, to No. 2 Flying Training Sch., Digby; 20.12.27. H. N. Thornton, to No 1 Air Defence Group, H.Q.; 20.12.27. B. E. Embry, A.F.C., to No. 1 Flying Training Sch., Netheravon; 20.12.27.

Flying Officers: R. A. A. Cole, to No. 4 Flying Training Schl., Middle East, 24.11.27. L. W. Dickens, A. P. K. Hattersley and C. F. C. Coaker, to No. 4 Flying Training Schl., Middle East, 2.12.27. F. Gower-Jones to No. 8 Sqdn., Middle East, 2.12.27. T. A. Hale-Munro to No. 29 Sqdn., Duxford, 5.12.27. C. G. C. Woledge to Elec. and Wireless Sch., Flowerdown, 18.11.27. J. Warburton, to No. 5 Sqdn., India, 6.12.27. L. C. Phillips, to No. 28 Sqdn., India, 6.12.27. F. J. Parker, to No. 20 Sqdn., India, 6.12.27. I. J. Fitch, to No. 5, Sqdn., India, 6.12.27. R. H. Horniman, to R.A.F. Station, Kenley, 13.12.27. A. I. Riley, A.F.C. and S. M. Thomas, to No. 45 Sqdn., Middle East, 23.11.27. J. S. Phillips, to No. 45 Sqdn., Middle East, 1.12.27. R. Legg, to R.A.F. Depot, Uxbridge, 27.11.27. G. R. A. Pallin, to Elec. and Wireless Sch., Flowerdown, 9.12.27. T. H. Finney, to No. 602 City of Glasgow (B) Sqdn., Renfrew, 11.12.27.

Flying Officers: R. G. Hart, M.C., to Elec. and Wireless Sch., Flowerdown; 6.12.27. D. Robinson, to No. 43 Sqdn., Tangmere; 22.11.27. C. H. Brill, to R.A.F. Training Base, Leuchars; 20.12.27. D. Macfadyen, to R.A.F. Cadet College, Cranwell; 20.12.27. F. J. O'Doherty, to No. 2 Flying Training Sch., Digby; 20.12.27. E. A. McKinley-Hay, to No. 600, City of London (B.) Sqdn., Hendon; 20.12.27. V. C. Taylor, to No. 23 Sqdn., Kenley; 20.12.27. H. A. Howes, to No. 2 Flying Training Sch., Digby; 20.12.27. E. J. George, to R.A.F. Training Base, Leuchars; 20.12.27. R. J. Legg, to R.A.F. Cadet College, Cranwell; 20.12.27. R. R. Nash, to R.A.F. Station, Duxford; 20.12.27. G. A. V. Tyson, to No. 32 Sqdn., Kenley; 20.12.27.

Pilot Officers: H. H. Martin, to No. 43 Sqdn., Tangmere, 7.12.27. R. R. Carroll, F. B. S. Downey, J. F. Macdonald, J. D. Richardson, S. R. Ubee, R. A. Chignell, H. G. Hamilton, D. Menzies, J. L. Smallwood, D. S. Collins, J. E. McCann, G. F. Overbury, and F. L. Truman, to R.A.F. Depot, Uxbridge, on appointment to Short Service Commns., 9.12.27. E. E. Carter, W. F. Murray, J. A. S. Outhwaite, M. M. Freeman, G. F. Hales, C. H. R. Little, and C. Stephenson, to R.A.F. Depot, Uxbridge, on appointment to Short Service Commns., 13.12.27.

Stores Branch.

Flight Lieutenants: J. Lundon, to R.A.F. Station, Northolt, 10.10.27. C. J. Polden, to Air Ministry, Directorate of Equipment, 2.12.27. W. R. P. Allen, to No. 45 Sqdn., Middle East, 23.11.27. L. E. Carter, D.C.M., to R.A.F. Depot, Uxbridge, 16.12.27. C. T. Davis, to R.A.F. Station, Upavon, 7.12.27.

Flying Officers: E. A. Burridge, to H.Q., Transjordan and Palestine, 2.12.27. F. R. Lines and T. I. Iliff, to R.A.F. Depot, Middle East, 2.12.27.

Flying Officer M. H. Jenks, to Station H.Q. and Storage Section, Andover, 15.12.27.

Accountant Branch.

Flight Lieutenants: L. de L. Leder, to No. 14 Sqdn., Middle East, 2.12.27. W. E. Fisher, M.C., to Central Accountant Office, Poona, 6.12.27. C. H. Moore, to R.A.F. Depot, Uxbridge, 21.11.27.

Flying Officer: F. C. Langley, to No. 8 Sqdn., Middle East, 2.12.27.

Medical Branch.

Flight Lieutenants: C. G. J. Nicolls, M.B., to No. 31 Sqdn., India, 23.10.27, T. W. Wilson, to No. 27 Sqdn., India, 9.11.27.

Flight Lieutenant (Dental): J. R. Williams, to R. A.F. Station, Duxford, 21.12.27.

Flying Officer: C. W. Coffey, to R.A.F. Station, Biggin Hill, 1.1.28.

Flight Lieut. J. O. Osborne, M.B., to R.A.F. Station, Upper Heyford, 2.1.28.

Chaplains' Branch

Rev. R. M. Bankes-Jones, M.A., to Station H.Q., Hinaidi; 3.12.27.

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IN PARLIAMENT

Royal Air Force and the Schneider Trophy

LIEUT.-COMMANDER KENWORTHY, on December 19, asked the Secretary of State for Air if he is now in a position to make any further statement as to the action to be taken by the Air Ministry to retain the Schneider Cup next year?

Sir Samuel Hoare: There has been general agreement in aeronautical circles for a considerable time past that the holding of the contest for the Schneider Trophy annually is not in the best interests of civil aviation, since an interval of a single year is insufficient under modern conditions to secure the progress in the design of marine aircraft which was the express object of the trophy's founder. This view has previously been urged by delegates of the Royal Aero Club to the Fédération Aéronautique Internationale, but has not hitherto found general acceptance.

An understanding has, however, now been arrived at with the Italian Government that they will support the project for a biennial instead of an annual contest in future, and that accordingly, providing the other countries which are possible competitors agree, no contest shall be held in 1928. The United States, French and German authorities have been consulted informally and are understood to be in concurrence.

I may add that in discussing this question with the Italian authorities I made it clear that Great Britain was prepared to compete next year if this was desired by the other countries concerned. Whether the contest is in fact held in 1928 or 1929, it is my intention to take all action necessary to ensure that this country is worthily represented and no effort spared to secure another victory.

Lieut.-Commander Kenworthy: May I ask if the latter part of the answer means that the Air Ministry will give support to the competition, and whether the pilots of the Royal Air Force will be allowed to compete?

Sir S. Hoare: It will be premature to go into details, but we do intend to give it support. We shall consider a question of that kind, and there is ample time for further consideration. In the meantime, we are proceeding at once with the development of machines and engines.

Lieut.-Commander Kenworthy: Do I understand that pilots of the Royal Air Force will be permitted to compete?

Sir S. Hoare: I cannot go into details of that kind, but we shall do everything we can to ensure success. We have already begun the programme of development of engines and machines.

Sir Alan Cobham's Machine

COLONEL DAY, on December 21, asked the Secretary of State for Air whether he is now in a position to state the amount of damage done to Sir Alan Cobham's machine during its landing at the seaplane base at Malta on Tuesday, November 28?

Sir Philip Sassoon: A pair of wing tip floats was carried away by the swell during landing and the port elevator and lower port plane were damaged by heavy sea whilst the machine was being beached. These parts are being renewed with as little delay as possible.

Schneider Trophy

MR. VIANT asked the total number of machines designed and constructed for the Schneider Trophy, 1927; and for what purpose will they now be used?

Sir P. Sassoon: Seven high-speed aircraft were built this year, and six of these were made available for the Schneider Cup race. They were constructed for the purpose of carrying out an important programme of research into the problems of high-speed flight and they are being used for that purpose. I may add that valuable data bearing on the problem of improving the speed of aircraft have already been secured with these machines.

Mr. Viant asked the Secretary of State for Air if he can give the total expense incurred by the Air Ministry in connection with the race for the Schneider Cup, 1927, including the cost of the machines and all operational expenses, the charge for pilots and mechanics during the whole period, and the outgoings in respect of travelling, hotel and housing expenses, and the other charges incidental to the race?

Sir P. Sassoon: The cost incurred for transportation, travelling, subsistence allowances, oil, etc., in connection with the race is estimated at approximately £3,000, but all the accounts have not as yet come to hand and this figure is therefore provisional. The cost of the machines made available for the Schneider Trophy race cannot legitimately be reckoned as part of the expense incurred. The machines were constructed under a programme of development work on high-speed aircraft, and experimental machines for this purpose would

still have been necessary even if there had been no contest for the Schneider Trophy.

Sir Harry Brittain: Is it not right that we should not forget the whole-hearted hospitality of the Italian Government to the entire team during their stay there?

Lieut.-Colonel Heneage: Was not the expenditure on these aeroplanes well worth it in view of the impetus given to British trade?

Sir P. Sassoon: Yes.

Airship R.100

Mr. Viant asked the total structural weight, with the proposed passenger accommodation, of the airship R.100; how this weight compares with the maximum weight allowed in the contract for this airship; if the scheme of factors for safety as laid down in the Report of the Airworthiness of Airships Panel has been closely adhered to in the design of this airship; if the two scientists who have been examining the plans of the two airships have concluded their examination of the R.100; and if formal approval has been given to the design of this airship?

Sir P. Sassoon: I am reluctant at this stage to give estimated figures, which may subsequently have to be modified; but on the information supplied to me by the company it does not appear likely that the total fixed weights of R.100, including passenger car and fittings, will exceed the contract figure of 90 tons. The two scientists who are investigating the airworthiness of the two airships cannot complete their investigation of R.100 for some months, but so far it appears that the factors of safety laid down in the Report of the Airworthiness of Airships Panel have been fully adhered to.

Isacco Heliogyre Machine

Colonel Day asked how many aeroplanes known as the Isacco Heliogyre have been acquired or are being built; and what was the approximate cost?

Sir S. Hoare: The Air Ministry has purchased a plan of the machine referred to, and the right to build one aircraft of this type, but no such aircraft has been acquired and it will be some time before sufficient technical preparation can be made, in conjunction with the inventor, for building a machine; the second part of the question does not arise.

AIR MINISTRY NOTICES

Rules for Flight over Air Routes

1. As the result of a recent decision by the International Commission for Air Navigation, certain amendments to paras. 31 and 33 of Annex D, Section III, of the International Air Convention, dated October 13, 1919, will be brought into force as from February 10, 1928.

2. The amended paragraphs will then read as follows, all alterations from the original text being printed in italics:—

31. *In order to obviate the increased risk of collision which exists on air traffic routes, the following rules shall, so far as* it is safe and practicable, *be observed when flying on or in the vicinity* of such *routes*:

(a) Every aircraft when *flying by compass along the straight line (rhumb line) joining two points* on an air *traffic* route *in common use*, shall keep *such line at least* 500 *metres on its left*.

(b) Every aircraft following an air *traffic* route, which *has been* officially recognised, shall keep such route *at least* 300 *metres on its left*.

(c) Every aircraft *which, in the vicinity of a route frequented by aircraft, is following a line of land-marks such as a road, railway, river, canal or coastline, &c.*, shall keep *such line of landmarks at least* 300 *metres on its left*.

(d) *An aircraft shall not fly keeping any of the lines or routes above referred to on its right, except at a distance therefrom sufficient to avoid aircraft following such lines or routes in accordance with these rules.*

(e) *When crossing one of these lines or routes above referred to, an aircraft shall cross it at right angles as rapidly as possible and as high as reasonably practicable.*

33. Every aircraft in a cloud, fog, mist or other conditions of bad visibility shall proceed with caution, having careful regard to the existing circumstances.

Every aircraft when flying beneath clouds shall always do so, so far as it is safe and practicable, at such a distance below the clouds as will enable it readily to see and be seen.

3. An amendment to the *Air Pilot*, pages 19 and 20 (Revised), will be made in due course.

No. 97 of 1927.

Code to be Employed for Abbreviating W/T Route Traffic Messages

In order to relieve congestion on the 1400 metre W/T route traffic service the following code for the abbreviation of routine departure and arrival reports will be put into force as a trial measure during the present winter season, and will become operative as and from the date of publication of this Notice:—

CODE TO BE EMPLOYED.

Plain language.	*Code letters.*
Departure	D
Arrival	A
Paying passenger	PP
Non-paying (free) passenger	PF
Official (service) passenger	PS
Mails	PO
Postal packages	COPO
Freight	FRET
Flying material	MA
Baggage	BAG
Perishable goods	FRET CRUP
Live stock	AVI
Departure delayed on account of weather	DRET TEMPS
Departure delayed on account of engine	DRET MOT
Departure delayed owing to wait for connection	DRET ACORR
Departure delayed on account of lack of aircraft	DRET MAMA

When stating the town of destination of the aircraft in these reports the code letters for towns given on pages 14-15 of the revised Appendix to the Air Pilot, in connection with the code for the through booking of seats by W/T, will be employed.

METHOD OF CODING AND DECODING.

Departure reports will be coded by an aerodrome official responsible for this duty; similarly, arrival reports will be decoded by this official, and the messages passed to the Air Transport Company or aircraft owner "en clair."

The sequence in which information is given in these reports will be as stated on page 12, sub-paras. 4 (i) and (ii), of the revised Appendix to the Air Pilot; further, the information concerning the load of the aircraft will be given in the order indicated in the code, *e.g.*, paying passenger, official (service) passenger, etc.

No. 99 of 1927.

THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

New Wakefield Cup

The current issue of the Journal of the Society of Model Aeronautical Engineers contains the rules for the cup presented to the Society by Sir Charles Wakefield for international competition. Through his generosity we are able for the first time in this country to consider the holding of international model aeroplane competitions. General rules for all future competitions have been drawn up together with rules for the competition which will be held in this country in 1928.

Each country may enter, through a recognised society, a team of not more than six models, the cup being held by the winning society, while a cash prize will go to the entrant of the winning model. The first competition will be for duration of flight, and each entrant will be allowed three flights. Any type of model driven by any kind of power plant may be used provided the total weight of the model is not more than 11 lbs., and that the square root of the maximum cross-sectional area of the fuselage is not less than one-tenth of the length of the model from nose to tail. The competition will probably be held during June or July.

This notice is, of course, only preliminary to a longer one, but it is as well that model makers should know of the competition as soon as possible, and be given the essential parts of the rules. Though the team for this country will be chosen by the S.M.A.E. (by eliminating trials before the date of the competition) entrants need not be members of that society. Further particulars will be issued as soon as possible by Mr. S. H. F. Crouch, Secretary of the Society.

PUBLICATIONS RECEIVED

Woodworker Series Table Designs. Living Room Furniture Designs. Evans Bros., Ltd., Montague House, Russell Square, London, W.C.1. Price 2*s*. 6*d*. each net.

Pocket Diary for 1928. Adlard and Son, Ltd., 21, Hart Street, Bloomsbury Square, London, W.C.1.

Aeolus, or The Future of the Flying Machine. Major O. Stewart. Kegan, Paul, Trench, Trubner and Co. Price 2*s*. 6*d*. net.

Annual Report of the Board of Regents of the Smithsonian Institution, for the Year ending June 30, 1926. Smithsonian Institution, Washington, D.C., U.S.A.

Modern Aircraft. By Major Victor W. Page. The Norman W. Henley Publishing Co., 2, West 45th Street, New York, U.S.A. Price $5.00 net.

Aeronautical Research Committee Reports and Memoranda: No. 1072 (*Ae.* 254).—The Characteristics of Certain Aerofoil Sections for Infinite Aspect Ratio. By A. S. Hartshorn, B.Sc. November, 1926. Price 9d. net. *No.* 1102 (*M.*50).—The Undercooling of Some Aluminium Alloys. By Marie L. V. Gayler, D.Sc. May, 1927. Price 1*s*. 9*d*. net. H.M. Stationery Office, Kingsway, London, W.C.2.

Bulletin du Service Technique de l'Aéronautique. No. 7. *Resultats d'Essais Aerodynamiques. By Paul Puvrez.* October, 1927. Service Technique de l'Aéronautique. Chaussee de Waterloo, Rhode St. Genèse, Belgium.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1926

Published December 29, 1927

16,474. Ford Motor Co. Airplanes. (255,052.)

23,019. Airship Guarantee Co., Ltd., B. N. Wallis, and C. D. Burney. Lighter-than-air aircraft. (281,419.)

25,905. A. Rohrbach. Lamps or searchlights for aircraft. (260,576.)

APPLIED FOR IN 1927

Published December 29, 1927

21,444. H. Junkers. Centrifugal governors. (281,580.)

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